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THE ROLE OF GEOGRAPHY IN GENERAL EDUCATION¹

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President of the Association, 1954-55

Last Fall, I had the privilege to attend a national conference called in Ottawa by the Canadian Humanities Research Council for the purpose of discussing the place of the humanities in modern education, and more specifically their contribution to government and society. I heard a great deal about the classics and their virtues for training the future citizen, in comparison, if not against, the more practical subjects in the curriculum of studies. It was not inferred that scientific education should be entirely omitted, but the consensus was that such specialized training could come at a later stage, when the mind of the student has been fertilized and broadened by what we call in French "culture générale" or general education. No attempt was made, during that conference, to draw a list of the topics that ought to be taught in order to achieve such a worthy goal in education. Most speakers referred to the classics, Latin and Greek, and to the modern languages, especially the mother tongue; others mentioned History and the Social Sciences. I suggested that Geography should not be forgotten on an ideal curriculum, as is usually the case, and tonight, I wish to elaborate on that idea that Geography has its role to play in general education.

In North America, where geography is too often looked upon as a practical science, it is not out of order, I believe, to remind you that our discipline has, or should have, its share in the training of students for a broad and liberal education. We all know that geography, understood in its true meaning, is an explanatory science. Good geography teachers no longer confine themselves, now-a-days, to a more or less romantic description of landscapes, nor do they enumerate dull lists of resources; on the contrary, they endeavour to make their listeners understand why, how and where the phenomena, both physical and human, that they talk about do occur.

A few years ago, in 1949, I was asked by UNESCO to comment on the teaching of geography and to evaluate its importance in training students at the pre-university level. One of the first questions of that enquiry was does geography help them to acquire a wider knowledge - more "culture générale"? I suggested then that an international survey should be conducted in order to ascertain the place of our discipline in the curriculum. That was partly done during the Seminar held at Ste-Anne de Bellevue in 1950, and the survey was completed later and published in Paris.² No one will be surprised here to learn, in reading that pamphlet, that geography holds a very modest place in the programmes of studies, even in the countries of Western Europe, where most progress has been recorded during the last century.

There is ample evidence that geography is looked upon as the poor relative, *la parente pauvre*, among other disciplines, and that its teaching is inadequate. Proof of it is found not only in the school programmes, but nearly everyday and everywhere by the fact that most people, even a number of so-called cultured people, betray marked ignorance of geography. Of this, the press, radio and television provide too frequent examples. There are many causes of such ignorance. They are not easy to find out, but I think that most of them could be traced back at that level of education where the notions of general culture are acquired, namely at the

¹ Presidential address delivered at the Fifth Annual Meeting of the Canadian Association of Geographers, Toronto, Ontario, 1955.

² History, Geography and Social Education; UNESCO, Paris, 1953.

secondary level. Educators agree, in most countries, that the elements of geography should be taught at the primary level, and be developed, more or less, at a higher level, as time permits. In school curriculum, you read edifying words on the educational value of geography as a means of broadening the pupils' minds. But, if you go into the matter any further, and if you try to discover what kind of geography is taught, how much time is devoted to it, what methods are used, and what textbooks, maps, other teaching aids are available, you will be painfully surprised to find how little the results achieved correspond to the programmes themselves.

When teachers are asked why there is so little for the mind in geography, their pretexts vary along the following lines: we are afraid of over-expanding the programmes; of overtaxing the memory of the students; geography is an encroaching subject; young people cannot be taught everything in the world that they should know during the present air and atomic age.

My answer to these objections is that we are able to teach geography without overtaxing the student's brains, provided the true nature of our science and the spirit in which it is taught, even in the atomic age, are clearly understood. Within the natural and human sciences, there exists an independent geographical field, un domaine géographique autonome, from which geography draws most of its information.¹

When geography borrows elements derived from the related sciences, it synthesizes those elements with its own particular methods and way of thinking, which is best described as esprit géographique, the geographical mind. It is something intangible and difficult to define. We are thinking geographically, when we consider jointly man, environment and space. Our colleague Robert Flicheux says that "the geographical way of thinking implies not only the possession of precise knowledge about the world, but also the ability to preserve the proper balance of elements borrowed from other sciences dealing with the earth and man".² Louis-Emond Hamelin goes further in stating that "under that angle, 'geography' is synonymous with 'culture'".³

Let us take some examples. Here I wish to stress the idea of type, developed by Pierre Deffontaines - la notion de type, as he says. What should geographers observe and try to explain? Not spectacular phenomena, not what is unique or biggest in the world, but the typical landscape, the typical farm house or urban dwelling, the typical environment.⁴

Geography is not restricted to the explanation of the local and national environment. The latter is used as a starting point, as a base of comparison, whenever possible, to proceed from the known to the unknown. One of the objectives of the study of foreign lands and people is to fight self complacency, le chauvinisme or jingoism. Thus geography overcomes national isolation, and shows to our young people that there are other peoples whose life is different from or similar to our own, that differences between peoples do not necessarily reflect defects, and that better knowledge of peoples by each other leads to mutual esteem. It is quite obvious, in this second half of the 20th century, that the interdependence of all the earth's inhabitants is becoming ever greater, due to inventions increasing the ease and speed of transport and of the transmission of thought. There is no need for me to elaborate on these aspects before an assembly of geographers.

¹ Hartshorne, Richard: "The nature of Geography"; Annals of the Association of American Geographers, 29, 1939. Chapter XII may also be found in: Dohrs, F. E. et al., Outside readings in Geography; Crowell, New York, 1955, pp. 16-25.

² Some suggestions on the teaching of Geography; UNESCO, Paris, 1950, p. 15.

³ Hamelin, Louis-Emond: "Quelques aspects méthodiques de l'enseignement de la géographie dans le Québec"; Culture, XVI, 1955, p. 69.

⁴ Dr. Brouillette showed a selection of about 30 coloured slides of typical landscapes throughout Canada at the conclusion of his address. - Ed.

But the consequence of modern progress, of that growing human solidarity, entails some obligations for geographers. We are bound to instruct our students about the efforts made to improve human relations, about international organizations, about problems of land use in various countries, about the improvement of the living standards of peoples, and consequently about the defence of human rights. The ultimate aim of geography teaching is to help citizens to achieve what Wallace Atwood has called "world mindedness", designed to strengthen world peace. The object is not to diminish children's love of their native land, but to make them understand that human progress is linked to the ideal of peace, and that peace is only possible if each people respects the freedom of the others. Geography tends naturally towards this ideal. We do not have to distort it, all we have to do is to teach it intelligently and honestly.

Here is the core of the problem: how can Geography be taught intelligently? Well trained teachers are necessary, of course, and it is the task of the teachers' training colleges to prepare them. Adequate and up-to-date documentation is also essential, and that should be a matter of concern for all of us, because the librarians alone cannot provide precisely what we need. Geography teachers are often unable, either by lack of time or for some other reasons, to rationalize the information wanted for their actual teaching. This problem was discussed at length at the UNESCO seminar. Most of the participants felt that a world documentation centre should be established for that specific purpose. But the idea seemed so unrealistic that UNESCO did not even mention it in the Seminar report. The only reference on the subject was to state how a country like France had organized its documentation available to geographers.¹ May I remind you that such facilities as the French geographers have are unknown in Canada. Our Association might investigate the possibility of establishing a similar centre. There is another requirement to enable the teacher to fulfill his task properly: it is to provide him with suitable material equipment. However bright he is, he cannot teach geography empty handed. He needs a special room or workshop in the school, equipped with maps, pictures, slides, a projection apparatus and other appropriate devices. He must also be allowed to lead his pupils outside on field trips. It is the task of the educational authorities to provide for such equipment and help.

Geography, understood in its full meaning and taught consequently, has an educational value that permits it to be compared favourably with any other discipline in the curriculum of studies. It cultivates the main intellectual faculties of young students as well as adults.² Geography develops the reasoning power, since we try to explain the how and why of the observed phenomena. Geography develops memory by the use of its special vocabulary and its wide nomenclature, necessary to give precise notions of the earth's features, places and peoples. Let us be careful in this instance not to be abusive of nomenclature and overtax the pupils' minds with dry lists of names. We can avoid that pitfall by the constant use of maps, drawings and pictures, which develop the visual memory, and appeal, at the same time, to the reasoning power. Other faculties of the intellect are also cultivated by our discipline: imagination, sensitiveness and will-power. The alert fancy of young people is easily caught by the colourful and accurate description of foreign lands and their inhabitants. Their emotions are likely to be truly genuine, when they read or they hear about the true adventures of famous explorers, the conquerors of the poles, of the highest summits, the deepest caves. Such topics of interest would act, I think, as a counterpoise to the harmful abuse of comics and to the craze of space-ships.

The main contribution of geography in general education is to acquaint the future citizen with realities not with fancies, and, in doing so, to help him to be adapted to his environment. Thus, geography predisposes him to a better understanding of worldwide problems.

Nevertheless, Geography is not to be elevated above all the other disciplines of the curriculum. In a well balanced programme of studies, geography comes at the crossroads of the natural and human sciences, hand in hand with history. I know that the teaching of Language, Mathematics and Religion are more fundamental than Geography. But, just give your students a taste for Geography, and you will be surprised at the results.

¹ A handbook of suggestions on the teaching of Geography; UNESCO, Paris, 1951, p. 79.

² Calahan, H. A.: Geography for grown-ups; Harper, New York, 1946.

Geography in fact stimulates the student's curiosity more than any other topic taught in the school. If, for instance, the student hears of events through the press, the radio or T.V., he is often passionately interested and wants to know more from his teacher about such happenings. An intelligent teacher will not rule the question out of order, if it is pertinent to geography. His duty is to take advantage of the student's curiosity, and to direct it towards geography - to use it to put more life in his teaching, to break away from the routine. When the teacher uses such an activity method he established a link between his textbook and life, a basic task in his profession.

School teachers could do much better than simply satisfy their students' curiosity for passing current events. They can enroll their interest and direct it towards some field work, such as collecting information on their local environment. Under proper guidance, young people could set to work and gather data that are not available in books or in official reports. I will mention just a few, as they come to my mind. I am sure that you will think of many more. On climate, for instance, some obvious phenomena are not recorded in the meteorological publications, such as the date of the first snowfall of winter, that of the lasting snow cover, of its disappearance in spring, of the sowing of grain, of the cutting of hay, the harvest of wheat¹ and other cereals, the migration of common birds, and many other subjects of observation. Human and economic geography is still a more fertile field for observation by keen-eyed youngsters: where do people living here come from? What are their occupations? What are the types of houses? How are they distributed? A typical farm is like a museum for geographers in its location with regard to transport facilities; the use of the various buildings or of the pieces of cultivated land; the implements, the products, the markets, and so on. In the cities, where the environment is more complex, there are again simple observations to be made. Children could describe the house where they live, the stores where their parents go shopping, the parks where they play, the traffic of the streets, and even the places where their parents work. If the results of such local studies were compiled and returned to a central organization, we would be astonished to see how much we still ignore in the day-to-day ways of living in our own country.

Do not think that it is an impossible task. There are examples of similar collective work made along those lines in many countries. The Land Utilization Survey of Britain was partly made in this way, under the direction of Dr. Dudley Stamp. Hundreds of teachers and thousands of their students have contributed to that huge inventory. Besides the gathering of valuable data, another worthy result would be achieved: that of developing among the young generation a genuine community spirit. The geographer apprentices, as we may call them, are thus initiated in the methods of preserving natural and human resources. Later in life, they are likely to become more open-minded citizens.

Can geography help the future citizen to form his own personal opinion about human problems? I had to answer that question in my comments for UNESCO in 1949. I said certainly, provided that the student be taught in school not what he should think, but how to form his opinion. That is done when he is trained to reason correctly with regard to facts, to seek objectivity and to rise above passions any given issue arouses in him. The study of geography, correctly understood, helps to exercise the critical faculties early in life. Geography explains the nature and the conduct of human beings by a logical series of ideas based on facts of a permanent or passing nature. The permanent facts are those, in the main, concerning natural phenomena, while the passing facts relate to the social and economic developments.

Let us take some examples. If we wish to explain the landforms of a region, we shall show the students, if possible on the spot, that such landforms as he sees are due to the evolution of the earth's crust. He will understand that the main features are due to stream erosion or deposition, due to glacial influences on the profile of a valley or to the action of waves and currents along a shoreline. In such a field of stable facts, there is little room for ideological controversies, even if there is plenty for discussion among adult geographers on geomorphological problems.

¹ The average date of the beginning of wheat harvesting is known in most countries producing wheat, except in Canada. See Van Royen, William: The agricultural resources of the World; Prentice-Hall, New York, 1954, fig. 39, p. 34. This map shows the dates when the wheat harvest begins in U.S.A. and Canada. But no date is given for the Prairie Provinces; July 11 and 21 are mentioned for S.W. Ontario. Ironically, the Canada Department of Agriculture is quoted as the source of reference.

In the second category of facts - those relating to human and economic geography - the same is not so true. Here, the influence of man dominates that of nature, at least in the temperate zones. The arguments used in order to show the child how men draw their subsistence from the soil and from industries are much more topical and variable. Ways of life are continually evolving; man adapts nature to his needs and invents ever more refined techniques. Even in this case, however, geographers are reasoning much more about facts than about theories. But this is because man is free to choose between several ways of organizing his life, because there is no blind law of determinism, and because ways of life may differ to the extent that men who exploit environments possessing almost the same natural resources also differ.

A careful examination of ways of life shows therefore that we are in the presence of free choice, of free will. The student will remember this lesson so that, later in life, he will see for himself how conflicting theories are advanced to explain economic and social phenomena, and that, in order to understand these phenomena he must give due weight to facts, show discernment and use his critical judgment.

I may add in conclusion that we geographers can protect our students against fallacious ideologies by the use that we teach them to make of their own reasoning powers. If attempts are made to convince them that only one social theory is right, and that everyone should subscribe to it, their instinct will tell them that they are free people, entitled to think for themselves, and on the basis of facts rather than vague theories. To think by oneself is a sacred right of all human beings. To the extent that geography contributes to such an ideal, makes it worthy a place in liberal education.

NORWEGIAN COLLABORATION IN THE ECONOMIC
DEVELOPMENT OF ARCTIC FINLAND

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ABSTRACT

The transfer of Petsamo Province from Finland to the Soviet Union following World War II isolated northern Finland from the ocean and cut it off from overseas trade.

Between the two World Wars the Petsamo corridor was used as a means for exporting Finnish lumber, and importing fuels and other supplies. It also provided the basis for a thriving tourist trade. There was the beginning of hydro-electric development of the Pasvik River, not only to supply power for the new Petsamo nickel industry, but also to further development of the whole region.

During the decade immediately following World War II, the loss of Petsamo, serious though it was, did not make its full impact on the area's economy. There was a heavy demand for labour needed in reconstruction of devastated Lapland, and Finnish contractors were busy constructing Soviet power plants on the Pasvik River.

This post-war boom period has now ended. Unemployment is severe, and the Finnish government is anxious to develop the resources of Arctic Finland by using seaports on the Norwegian coast. The present paper surveys the physical, economic and political factors involved in this and discusses the best routes to the sea-coast. The possibility of establishing in northern Finland not only a sawn lumber industry, but the manufacture of wallboard and other wood products is discussed, along with the part to be played in this by Norwegian hydro-electric power.

Should Finnish trade through Norway expand appreciably, there should be a demand in Finland for fish and other products of the Finnmark province of Norway and a corresponding improvement in the highly seasonal economy of the Norwegian coastal zone.

THE HISTORY OF THE UNITED STATES

OF AMERICA

BY

JOHN F. JOHNSON

PHILADELPHIA

THE HISTORY OF THE UNITED STATES OF AMERICA, FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME, IN THREE VOLUMES. VOL. I.

THE FIRST PART OF THE HISTORY OF THE UNITED STATES, FROM THE FIRST SETTLEMENTS TO THE YEAR 1776. IN TWO VOLUMES. VOL. I.

THE SECOND PART OF THE HISTORY OF THE UNITED STATES, FROM THE YEAR 1776 TO THE PRESENT TIME. IN TWO VOLUMES. VOL. II.

THE THIRD PART OF THE HISTORY OF THE UNITED STATES, FROM THE YEAR 1776 TO THE PRESENT TIME. IN TWO VOLUMES. VOL. III.

THE HISTORY OF THE UNITED STATES, FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME, IN THREE VOLUMES. VOL. I.

POSTGLACIAL EMERGENCE OF THE LAND AROUND
BATHURST INLET, NORTHWEST TERRITORIES¹

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During the final Pleistocene glaciation, Canada was covered by ice sheets, the weight of which depressed the crust of the earth. When the ice disappeared in the closing stages of the Pleistocene period, the land failed to regain its former level immediately and coastal areas were submerged by adjacent seas. Subsequently as the land recovered, the sea retreated until it occupied its present position.

In northern Canada, the terrain of all low-lying areas has been formed or radically modified by the postglacial marine submergence. Although the general physiographic effects of the submergence are known, the extent of the transgression and the mode of the emergence have only been studied in detail in few areas. Data is widespread from the central and eastern Canadian Arctic. On the north and west sides of Hudson Bay emergence has generally been about 600 feet although in restricted areas it is less than 400 feet.² On the north shore of Hudson Straits the emergence is at least 528 feet,³ and on the south side 898 feet.⁴ In some areas the evidence is confusing and interpretation is often difficult. This is particularly true of the mountainous sections of the eastern Arctic. On the south side of Frobisher Bay, Baffin Island, the land is reported to have risen 1,400 feet,⁵ whilst only 200 miles to the north around Cumberland Sound there has been little uplift since the ice retreated.⁶ In the western Canadian Arctic, general observations on postglacial submergence and the subsequent emergence of coastal areas, were made by nineteenth century explorers searching for the Northwest Passage. At the beginning of the twentieth century Hanbury recorded marine shells from the east end of Kent Peninsula 500 feet above sea-level.⁷ The first accurate determinations were made by members of the Canadian Arctic Expedition, 1913-18.⁸ From postglacial marine sediments, they deduced that there had been emergence of about 600 feet near Brock River, Darnley Bay. Farther east at the mouth of Tree River, sand, gravel and molluscs indicate an emergence of 500 feet or more. The Pleistocene shells which were collected suggested that the temperature of the sea has not changed greatly since the submergence.⁹

¹ Based on field investigations carried out for the Geographical Branch, Dept. of Mines and Technical Surveys, with whose permission this paper is published.

² Bird, J.B.: Postglacial Marine Submergence in Central Arctic Canada; Bull. Geol. Soc. Am., 65, 1954, p. 457-464.

³ Bell, R.: Report on Exploration on the Northern Side of Hudson Strait; Ann. Rpt. Geol. Surv. Can., XI, 1898, p. 30M.

⁴ Nichols, D.A.: Quoted in Richards, H.R.: Post-Wisconsin Fossils from the West Coast of Hudson Bay; Not. Nat. Aca. Nat. Sci., Phil., 84, 1941, p. 4.

⁵ Wengerd, S.A.: Elevated Strandlines of Frobisher Bay, Baffin Island; Geog. Rev. 41, 1951, p. 622-637.

⁶ Thompson, H.R.: Geomorphology: Baffin Island Expedition, 1953: a Preliminary Report; Arctic, 6, 1953, p. 245.

⁷ Hanbury, D.T.: Sport and Travel in the Northland of Canada; London, 1904, p. 262.

⁸ O'Neill, J.J.: The Geology of the Arctic Coast of Canada, West of Kent Peninsula; Rpt. Can. Arctic Exp. 1913-18, XI, pt. A, 1924, 107 pp.

⁹ Dall, W.H.: Mollusks, Recent and Pleistocene; Rpt. Can. Arctic Exp. 1913-18, VIII, pt. A. and supp., 1919 and 1924, 35 pp.

To the east, around Queen Maud Gulf, the highest strandlines observed are appreciably lower; it seems probable that the upper raised beaches have not been discovered. Little data has been obtained north of the mainland although emergence of 545 feet has been recorded from Resolute Bay on the north side of Barrow Strait.¹ All the information published before 1947 for the mainland of the western Arctic and Victoria Island has recently been assembled.² After field surveys on Victoria Island, Washburn deduced that the land has risen at least 625 feet and possibly more than 675 feet near Cambridge Bay. He also recorded that on Kent Peninsula, across Dease Strait, there are strandlines up to 600 feet.

In the summer of 1954, the author, while employed by the Geographical Branch, Department of Mines and Technical Surveys visited Bathurst Inlet. The Inlet is a southeastern extension of Coronation Gulf. It is 350 miles northeast of Yellowknife. Hanbury, Washburn and Fortier³ have all commented on the emerged marine features that are visible around the Inlet, but the only high-level marine deposits measured were at 500 feet on Banks Peninsula.⁴

The physiography of the Inlet facilitates more detailed observations than have been made previously in the Canadian western Arctic. The Inlet is 150 miles long and from 5 to 50 miles wide. On both sides the land rises steeply from the water to heights of at least 800 and in some places 1,400 feet. Sandstones, dolomites, quartzites and trap rocks, all of which have weathered rapidly under frost action, are found in the area and have been the main sources of material for strandlines. The long axis of the Inlet is south, southeast, parallel to the main direction of the last movement of the ice sheet. Any inequalities in the rate at which the land emerged, as expressed by tilting of strandlines, might, on theoretical grounds be expected to be maximum in the direction of ice movement.

Altitudes of raised marine features were determined by two types of aneroid barometers. Three inch aneroids by Instruments Limited, reading directly to five feet, and aneroids by the American Paulin Company reading directly to two feet, were used with closely corresponding results. In all cases corrections were made for air temperature and changing barometric pressure. Altitudes are expressed in feet above mean sea-level. This was easily found as the tidal range is less than two feet.

Evidence for postglacial emergence of the land is found throughout the Inlet in the form of marine shells, beaches, terraces, water sorted muds, silts and sands, all raised above present sea-level. These forms are numerous at lower altitudes but are less frequent at higher elevations, disappearing suddenly at a conspicuous height where the superficial terrain characteristics change abruptly. The level at which this change occurs is of considerable physiographic significance in the landscape. Three methods based on different features were used to determine this height, which corresponds with the upper limit of marine action.

The most reliable of these methods is to observe marine shells. Around Bathurst Inlet the shells found, were almost invariably *Saxicava arctica* with occasionally at low elevations (under 250 feet) *Mya truncata* and *Astarte borealis*. Although shells may be incorporated in glacier ice and subsequently deposited on the land at high elevations, the presence of unbroken, and occasionally still hinged, shells in patches of clay, and less frequently sand, was taken as good evidence for submergence up to at least that level.

The second method is to find the highest beaches of sand, gravel or pebbles in an area. As it is always possible that non-marine agencies, particularly proglacial lakes, might have formed the beaches, this evidence was not considered conclusive. If, however, the higher

¹ Nichols, R. L.: Geomorphological Observations at Thule, Greenland and Resolute Bay, Cornwallis Island, N.W.T.; *Am. Jour. Sci.*, 251, 1953, p. 268-275.

² Washburn, A.L.: Reconnaissance Geology of Portions of Victoria Island and Adjacent Regions, Arctic Canada; *Geol. Soc. Am. Mem.*, 22, 1947, 142 pp.

³ Fortier, Y.O.: Flights in 1947 over the Region of the North Magnetic Pole and the Mainland between the Arctic Coast, Great Slave Lake, and Hudson Bay, N.W.T.; *Geol. Surv. Can. Paper*, 48-23, 1948.

⁴ O'Neill, J.J.: *op. cit.* p. 50A.

beaches were part of an unbroken series extending to the modern beaches, a marine origin was considered probable. Thirdly, the lower limit of ground moraine, below which perched erratic boulders are uncommon and where signs of water sorting occur, was measured. This method has the same disadvantage as the second method, but when the height was found to be the same for long distances, and was supported by other evidence, it was accepted.

As might be expected, the three methods give different results for the amount of emergence. When all three features were found in the same area, the ground moraine level was on an average 35 feet above, and the upper shells were 100 feet below the highest beaches. When all three were exceptionally well-preserved, the vertical interval was much less and the ground moraine and the highest strandlines were at the same elevation.¹

The ground moraine level is generally the easiest to find except when there are large amounts of till. On the hills south of Buchan Bay, at the entrance to Bathurst Inlet, a series of careful determinations using this method gave a mean emergence of 723 feet. On Ekalulia, the most easterly of the Barry Islands, an equally clear series of measurements gave 717 feet. Close to the trading post, midway along the Inlet, the level was found at 728 feet, and farther south towards Western River at about 740 feet. Other determinations are shown on Figure 1.

The altitude of the highest strandlines varies considerably. At almost one half of the stations where observations were made it exceeded 700 feet. The difference even over short distances was, however, quite considerable. It is explained by local variations of exposure, slope and the availability of material for beaches. Occasionally conspicuous gravel or pebble beaches 5 to 10 yards wide were found in reentrants on steep coasts. Normally, however, only fragments of a high level beach survive and were recognizable by vegetation changes or patches of sand and gravel.

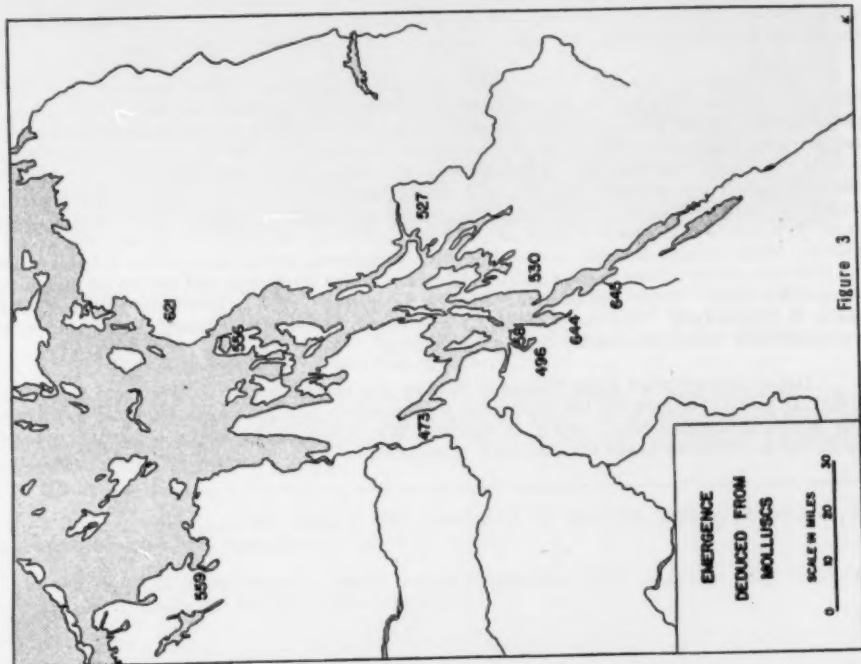
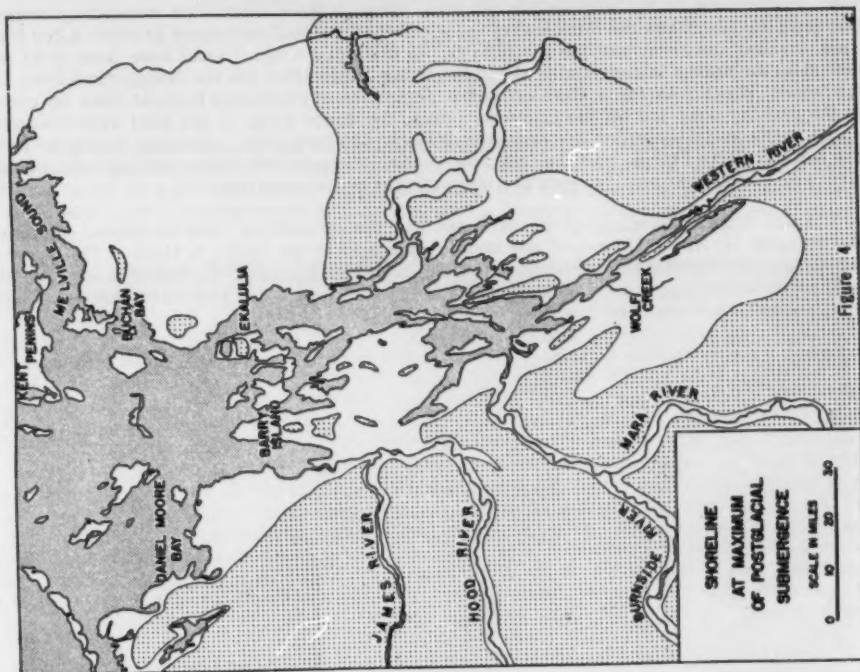
Pleistocene shells were even more difficult to find at high levels. In most parts of the Canadian arctic, shells may be found in marine deposits at low elevations. On the higher and older strandlines where the shells have been leached for a longer period, they are less common, and are entirely absent from the highest beaches.

Around Bathurst Inlet shells are common to about 400 feet. Above this they decrease rapidly in number and are only found in non-sorted clay and sand circles. Careful search revealed a number of localities in which *Saxicava arctica* has been preserved about 500 feet, and in two cases shells were found over 640 feet. In one of these areas, shells lying at a height of 644 feet were recovered from the uppermost three inches of an esker. As the shells were not incorporated within the esker they must be postglacial in age and were not preserved in glacially reworked marine material.

When the data for Bathurst Inlet is correlated, the mode of emergence may be deduced. Clearly the sea, (or a freshwater extension of it) was present in the area when the land was at least 710 and probably more than 725 feet lower than today. The land subsequently rose and small variations in the upper level of submergence may be due to slightly greater uplift in the south. The tilt however is less than 1 foot in 7 miles.² Since local variations of this order, may be due to small errors in the aneroids or differences in exposure of the beaches when they were made, it is concluded that the upper level is essentially as horizontal today as when it was formed. As the highest marine shells were found at 645 feet it is not known whether during the first 80 feet of emergence the water body was fresh due to the melting of large quantities of ice (although connected to the sea) or merely that marine shells had not had time to invade the area.

¹ Bird, J. B.: *Southampton Island*; Queen's Printer, Ottawa, 1953, p. 24. On Southampton Island, in the north of Hudson Bay, strandlines are 80 feet below the moraine limit and 60-100 feet above the shells.

² This figure of 1 foot in 7 miles or less, is in striking contrast to the tilt of the higher beaches in Scandinavia which reaches 2 feet a mile (Sauramo, M.: *The Mode of Land Uplift in Fennoscandia in Late Quaternary Time*; C.R. Soc. Geol. Finl., no. 13, 1939, and to tilts greater than 3 feet a mile found on some of elevated glacial Great Lakes strandlines.



With this data on emergence and a knowledge of the glacial geomorphology, the final stages of the waning of the ice-cap in the Bathurst area may be reconstructed. Towards the end of Ice Age, ice-flowed over the area towards the north-northwest. As the ice became thinner, it stagnated on the surrounding plateau, although for a short time some ice continued to flow down the Inlet. When the thickness of the ice in the Inlet had decreased to about 1,000 feet, the sea invaded the area, and the ice floated. In this final stage it must have been shelf ice, anchored on the higher islands and to the sides of the Inlet. After the ice disappeared from the lower levels, there was for a time extensive deposition of sediments brought down by rivers from the melting dead-ice on the plateaux. Thus, the lower parts of the Inlet were blanketed by sands, silts and muds which are occasionally over 300 feet thick. Although the finest sediments were scattered throughout the Inlet, the coarser material was deposited near the mouths of rivers and was subsequently reworked into complex terrace systems.

It was hoped that mapping the terraces and the strandlines, with particular emphasis on the different levels, would reveal any stationary stages in the uplift. A study of the terraces on the delta of the Burnside River showed that they had been formed and preserved fortuitously, as both constructive and erosional landforms, as the sea-level fell. The raised beaches, however, provided some evidence of stationary water planes.

At the highest levels well-formed beaches are rare, presumably because less material was available for their construction and a given level was not exposed to wave action for a long period as the land was rising rapidly. Two dominant levels were however found above 600 feet. A series of strandlines extends through the Inlet from Wolf Creek to Buchan Bay between 620 and 630 feet. Less well preserved is a widespread level at about 660 feet. Below these levels, wherever slope and exposure are suitable, elevated storm ridges are common. They are frequently only separated by a 2 to 3 foot vertical interval. No other dominant levels were found above 205 to 220 feet. At this altitude a group of stronger beaches was sometimes observed. Below this, beaches are again numerous and are often continuous down to the sea. Occasionally hills are found with better developed strandlines on their lower slopes. These are noticeable among the islands of the Quadyuk chain in the centre of the Inlet. Measurements showed a vertical spacing of less than 10 feet, and agreement in beach height between different islands may be coincidental. The strongest of these beaches is at 75 feet.

It is concluded after examining river terraces and the raised strandlines that uplift in postglacial times has been essentially continuous. There may, however, have been temporary halts or slowing down in the uplift from 660 to 620, and at 215 and less probably, 75 feet. It could not be determined whether the land is still rising. The vegetation and geomorphic form of the lowest strandlines indicates recent emergence from the sea.

The postglacial marine submergence has not perceptibly altered the rock form of the landscape because wave action at any particular level was of short duration. The effect on superficial deposits has however been considerable and there are conspicuous differences between the landscape above the level of marine submergence and below. Above about 725 feet the terrain is generally covered with boulders of various sizes and matches of fluvio-glacial sands and gravels are widespread. Below 725 feet glacial material has been washed from the steeper slopes into valleys and hollows. Terraces are numerous along all the larger rivers. Raised strandlines and storm ridges are almost universal, particularly on the trap rocks in the north, where ridges of water rounded pebbles completely cover many of the islands. Below about 300 feet marine clays are a significant feature in the landscape and the broad plains have developed on them. These flat or gently sloping areas are poorly drained and solifluction phenomena is widespread. The clays and silts are rapidly eroded by running water and most of the streams and rivers are muddy during the summer.

These observations from Bathurst Inlet on the emergence of the land and the effect of postglacial marine waters on the landscape are probably applicable to the whole coast westwards to the Mackenzie delta: and it is believed that although the degree of emergence may have varied in different areas the influence of submergence on the landscape is similar.

A LANDSLID MORaine IN BAFFIN ISLAND¹

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The Biological Camp of the Baffin Island Expedition, 1953, was placed in the northern section of Pangnirtung Pass.² Drained by Owl River, the Pass was here one and a half miles wide and 3,000 to 4,000 feet deep. Its cross-section was that of a severely glaciated trough; its walls displayed a classic series of truncated spurs, hanging valleys, and cirques. (Figure 1)



Figure 1. The Desert Fan, in the northern part of Pangnirtung Pass, viewed from the west. The mountains rise to 5,000 feet; the base of the Fan lies at 570 feet. Only the names "Owl River" and "June River" are official. (R. C. A. F. Crown Copyright photograph.)

From one such cirque, half a mile south of Biological Camp, a wedge-shaped area of debris extended downward to Owl River at the axis of the Pass. This debris fan provided an interesting exercise in the technique of multiple working hypotheses, for most of its features could be explained in at least two ways.

¹ Paper presented at the January 1955 meeting of the Southern Ontario Division of the Canadian Association of Geographers in London, Ontario.

² Biard, P. D., and others: "Baffin Island Expedition, 1953: a preliminary field report"; *Arctic*, 6, 1953, p. 227-251. (See Figure 4)

MORPHOLOGY OF THE DESERT FAN

The Desert Fan - so named (unofficially) by the biologists because of its paucity of life in a rich valley - has its apex in a cirque whose headwall is capped by an icecap a hundred feet thick. Below the ice-cliff, smooth striated slabs extend to the cirque bed, where nestles a small mass of ice, perhaps the remains of a proper cirque glacier, perhaps derived from avalanche material, but certainly inactive now. Close by the relict ice are two small moraines, one a lateral, the other a medial.

From the cirque, bedrock slabs slope downward towards the Pass floor, where they disappear beneath an increasing cover of drift. The gneiss is closely jointed, both parallel and normal to the surface, and weathers to particles having many of the characteristics of ball bearings. The Desert Fan's raw material is thus inherently unstable.

The drift is thickest along the central axis of the fan, where it is arranged in many irregular, rounded hillocks, up to 50 feet in height. (Figure 2). The hillocks are arranged transversely to the axis and are composed of medium and small debris of angular, sub-angular, and semi-rounded shapes. The "uphill" sides of most hillocks, and to a lesser extent the intervening flatter ground, are ribbed by parallel ridges and furrows, usually less than two feet in amplitude. The ridges and furrows do not have any visible internal structure, but, rather, seem to originate in the lee of boulders. Such boulders, like the smaller fragments along each ridge, are generally striated in a direction parallel to the ridge. In the upper part of the fan the bedrock slabs often take the form of excellently striated and polished *roches moutonnées*, downhill from which are unmistakable drift "tails". Indeed, several of the hillocks themselves have rock cores of this type. Both the bedrock exposures and the drift are chemically almost unweathered.



Figure 2. Looking down the Desert Fan from the slabs of the apical cirque. Ponds, hillocks, and lineations may be distinguished. Owl River truncates the lower end of the Fan.

With the widening and flattening of the fan towards Owl River, the ridge-and-furrow pattern spreads out, the debris becomes finer but thicker, and *roches moutonnées* are only occasionally visible. In this lowest part of the fan are at least 12 shallow ponds, most of them floored by bedrock, but some perhaps sustained by permafrost. All the ponds have varied in level, if one is to judge by numerous small deltas and shorelines around and between them. Melt-water from the cirque, in the form of a powerful stream incised 70 feet into the apical slabs, has reworked the south-central part of the fan, creating terraces of sorted and rounded pebbles and cobbles, but elsewhere there seem to have been few modifications of the initial constructional forms. There are no unmistakable traces of solifluction or frost-heaving: the striated drift ridges imply rapid movement.

Towards either flank of the Desert Fan the volume of drift decreases markedly, though its average size and angularity both increase. The flanks also provide object lessons in plant succession, for colonization is advancing toward the interior in a series of clearly marked belts. According to F. H. Schwarzenbach¹ the outer margins of the fan were invaded by plants as much as a hundred years ago, whereas the central hillocks have only a few decades of vegetational history.

ALTERNATIVE EXPLANATIONS

Two quite different hypotheses may be applied to these data. The first is that the Desert Fan is ground moraine and its striations are glacial; the second is that all the features result from the mass sliding of a corrie moraine and its outwash deposits.

In support of the first hypothesis we may point to the existence of glacial ice in the source-corrie; to the beautifully developed striae, grooves, and polishing (much the finest set in Pangnirtung Pass); to the abundance of crag-and-tail formations and the occurrence of textbook roches moutonnées; to the uneven nature of the drift, which, locally, might almost be called drumlinoid; and to the "plastering" of debris on certain rock knobs. The ridges and furrows are extraordinarily like those described as "ice-ridged moraines" by Dyson² and others; the fact that they occur less on downhill (lee) slopes than elsewhere also suggests glacial action. Some of the hillocks are morphologically and lithologically similar to kames.

The largest and most angular boulders almost always lie on the surface of the fan, where angular superglacial moraine habitually rests. Of the remaining drift, the water-washed terraces can be ignored as recent creations, while the general bulk of the fan could as well be ground moraine as anything else, in Pangnirtung Pass. The thinner but coarser-textured drift of the margins may be interpreted as lateral moraines destroyed by both contemporary and subsequent melt-streams. The lack of a terminal moraine may be laid to the account of the powerful Owl River.

The argument for a glacial origin is extraordinarily strong, but it fails to account for the straight sides of the Desert Fan - all the true moraines of Pangnirtung Pass are of the expanded-foot type - and it ignores several other points. In particular, the drift lies upon smooth bedrock slabs, which are steep at the fan's apex, and has itself some of the instability of ball bearings. Under the second, the terminal moraine of the apical cirque glacier was disturbed by some accident, such as the overflow of a former proglacial lake, and slid down the rock slabs to the floor of Pangnirtung Pass. Such a slide would tend to create a straight-sided fan - the present straight base has been cut by Owl River - and to fragment the moraine and outwash debris with increasing distance from the cirque. The hypothesis also accounts for the irregularities, lineations, and striations of the Desert Fan.³ On the other hand the "kames" must be regarded as lithological and morphological accidents and one must assume that earlier true glacial action formed the roches moutonnées.

Although both hypotheses were tested in the field, with delightfully variable results, preference for the second hypothesis has been strengthened by a reading of C. F. S. Sharpe's book, *Landslides and Related Phenomena*.⁴ Sharpe is at pains to stress the gradational relationship of the movements he describes and it is therefore difficult to decide which particular type was involved in the formation of the Desert Fan.

¹ Personal communication. Schwarzenbach, of the Swiss Foundation for Alpine Research, was the plant ecologist of the 1953 expedition.

² Dyson, J. L.: "Ice-ridged moraines and their relation to glaciers"; *Amer. Jour. Sci.*, 250, 1952, p. 204-211.

³ Cf. Russell, I. C.: "Topographic features due to landslides"; *Science Monthly*, 53, 1898, p. 480-489.

Smith, H. T. U.: "Periglacial landslide topography of Canjilon Divide, Rio Arriba County, New Mexico"; *Jour. Geol.*, 44, 1836, p. 838-860.

⁴ Sharpe, C. F. S.: "Landslides and related phenomena: a study of mass-movements of soil and rock"; New York, Columbia University Press, 1938, 137 pp.

The chief possibilities seem to be the following: (a) A debris-slide, which is "... rapid downward movement of predominantly unconsolidated and incoherent earth and debris in which the mass does not show backward rotation but slides or rolls forward, forming an irregular hummocky deposit which may resemble morainal topography." The debris-slide occurs particularly on undercut banks or in steep, unstable talus or similar drift.¹ (b) A debris-avalanche, which occurs on steep slopes in the presence of much water. Whereas the apical part of the mass may slip, the outer portion often becomes so saturated as to develop into a flow. The movement is common in glaciated regions and results in a rather long and narrow deposit. It is the "wet" equivalent of the debris-slide.² (c) An Alpine mudflow, a bouldery sub-type of the normal mudflow, which develops suddenly as melting snow lubricates a mass of drift. Many have been observed in motion, usually in confined channels. Even this flow - as opposed to the previous slip movements - can cause striations.³

In view of the scarcity of clay and silt in the Desert Fan it seems unlikely that much flowage can have occurred during the downhill spreading of the cirque moraine. It is therefore probable that the movement took the form of a debris-slide. To this slide the unstable debris and the large quantity of water available in the Arctic summer must have offered every encouragement.

¹ Ibid., p. 74.

² Ibid., p. 61.

³ Ibid., p. 59.

ON HUMAN AND ANIMAL ADAPTATION

Jacques Rousseau

Montreal Botanical Gardens

TRAVELLING WITH NORTHERN QUEBEC NATIVES FROM PREHISTORIC TO MODERN TIMES

or

THE ACCULTURATION OF QUEBEC NATIVES

To understand the natives and guide them in their cultural progress from prehistoric to modern civilization, we must first be familiar with their natural surroundings, their dependence upon nature and their attitude towards mankind.

The education of our own children is no simple problem, even if we feel that we know them perfectly, and if we bring them up to live in our surroundings, with the same ethnic elements to which we ourselves have been accustomed since childhood. Nevertheless, it would never occur to us to have anybody take up their program of education, simply because they happen to be passing through our neighbourhood. The passage of a population from a primitive cultural level to our own is a much more complex problem involving psychological, biological and economic aspects. Its solution must take into account not only the education of children, but also that of adults, - and, between ourselves, - adults are not easy to educate.

The natives of the subarctic and arctic wastes of Quebec and Labrador number less than five thousand in all: two thousand six hundred of them are Eskimo who live on the coastal fringe, and two thousand are Naskapi Indian, roaming the subarctic forest. The comments one hears on the respective qualities of both groups often reveal a lack of personal knowledge of either of the groups, if not both. It is true that the seal-hunting Eskimo and the bush Montagnais-Naskapi Indian do not show the same character: the Eskimo is always smiling; the bush Indian looks more severe. In both cases, however, this has no relationship to their intimate feelings. Their taboos, their aboriginal education have been imposed upon them over centuries of diverging traditions. Those who come into contact for the first time with any foreign people do not immediately gain an insight into the intimate character of the people involved, but only a few of the more striking conventions. These are a curtain behind which hides the soul.

Those who know the Eskimo and the Montagnais-Naskapi well, are convinced that the I.Q. of these natives does not differ from that of the white man. All degrees of intelligence and ability are found anywhere. After travelling amongst native hunters, a well-intentioned observer has sometimes noticed that there are good hunters as well as bad ones, and consequently has intended to teach the latter how to hunt. The fact is that some hunters succeed well simply because they have the ability, while others fail because they lack the physical and intellectual aptitudes. Amongst the white population, everyone has not the inborn capacity to become an accomplished pianist, an excellent driver, or an agile chimney climber.

When discussing the problem of the natives, there is a tendency to believe that there is one Indian problem, and that we should find a remedy to cure it. As with white populations, there are countless problems and we must seek many entirely different solutions even for those in the same tribe. Everyone knows that the smallest village in a country will not give rise only to a uniform group, but will produce farmers, factory workers, doctors, university professors and leaders. Why not expect the same with the native groups? When examining the future of the Northern Quebec natives, the suggestions made here do not apply at all to those Indians of the temperate zone who live in the neighbourhood of agricultural or industrial communities. They concern only those who are beyond easy reach of the white man's civilization and whose cultural level lies close to that of the primitive populations.

The majority of the Northern natives are still at the hunting stage. Many will remain at that stage for generations to come. Others will gradually take to the tasks of the white man. In the primitive stage the Eskimo and the bush Indians hunted caribou part of the time. Later, with the arrival of the white man, trapping was added to their activities. With both peoples dependent upon the caribou, a problem arises through the progressive disappearance of this mammal from the peninsula. A few decades ago there were probably a few hundred thousand

caribou in Northern Quebec; now their number is approximately five thousand. Any measure which would help to protect these herds, and thus increase their population, will in the long run serve the needs of all caribou hunters. Meanwhile, during the interim, they should obtain from other sources such substitutes as are needed to replace caribou skins and sinews. The introduction of other wild species which would breed well in the territory should be considered. The musk-ox could find a perfect habitat in that stretch of land between Ungava Bay and the Atlantic coast. The mountain goat could possibly find adequate breeding grounds in the territory between George River and the Labrador littoral. However, any variation in big game hunting which will divert the interest of the natives will, at the same time, constitute a protective measure.

Another important step to take is the protection of the tundra against the fire hazards. Tundra land vegetation burns more easily than wooded growth. Now that we have prospectors all over the peninsula, we should enforce in these areas, the regulations which already assure the protection of forested zones. Otherwise, through the ravages of fire, the Northland will be turned into a desert within a very few years.

Natives will never fully return to the occupations of the distant past. The evolution in the stages of culture is not entirely reversible. The ever-increasing practice of fur-animal farming and the fabrication of synthetic furs will probably bring, within a few years, a decrease in trapping activity. The latter will remain only a source of luxury furs. It will become more and more a part-time activity. As it is now, hunters spend a shorter period each year in the wilderness than ever before. Moreover, their families, in many instances, no longer accompany them during their winter wanderings, but remain at the post.

From the hunting phase to the pastoral stage the step is a normal one. But, what was done formerly over a number of centuries has now to be accomplished within the span of a couple of generations. Some consider even this too long. When directing the evolution of a country or a people, we should not look upon the span of one's own lifetime as the ideal criterion. The voluntary passage from hunting to the pastoral life has met with success with natives in other parts of the world; this could be done in northern Quebec-Labrador, provided we use the proper psychological and ethnological approach. Envisaging the change to pastoral activities, two domestic animals could be considered for introduction into the North; the Lapland reindeer and the northern breeds of sheep. For both types, the pasture conditions I have closely surveyed in the Ungava are fully adequate. The yak from Himalaya could be regarded also as a possible item, though I am not personally acquainted with its possibilities. Outside the grazing for some animals, there are no other agricultural possibilities in the Northland.

Handicraft should be encouraged. However, we should bear in mind that it will be always a part-time activity, without the hope of one day becoming an industry in itself. In pastoral groups, handicraft is particularly recommended as a pastime activity for the long periods of leisure.

The introduction of the reindeer and other farm animals (including fur-bearing animals) is not the panacea to all the problems. If it eventually allows a fraction of the native population to sustain itself without counting upon relief, the expenses incurred would be fully justified. Many natives must eventually participate in the activities of the white man; however, we must not come to look down upon them only as simple day labourers. Though some obviously will not rise above that stage, a great number of the natives I know personally have too much ability to be maintained at that level. They make excellent mechanics, truck drivers, camp cooks, and even prospectors. Of course prospecting takes place only during the summer months, and it would allow them to hunt and trap in winter. This will allow them to make the transition from the old customs to the new without an abrupt change. Knowing the wilderness better than anyone else, the Naskapi could certainly make a unique contribution here. The idea is not a theoretical one. The part natives have played in the discovery of the iron ore deposits in Northern Labrador and Ungava can never be emphasized enough.

The initiation of natives to our modern techniques is mostly a matter of proper teaching. Many mistakes have been made in the past. Good will is insufficient to promote education. The noteworthy achievements of the Anglican and Catholic missionaries to date should teach us a lesson. Horden, Evans, Peck, Father Arnaud, Father Babel, and all the others, came to the natives to live and stay with them. Before teaching, they mastered the dialect used by the local Indian. And, to the natives they brought reading and writing. They were their first

teachers. And when the first disciples learned to read and write, they in turn became teachers in their own families, with the result that the illiterate native has become such a rarity that I have never met one. To provide the natives with teachers who do not understand their language is a waste of time, money and energy. In the education of our own children, would we consider the use of a professor who speaks only Arabian or Bantu or any of the great cultural languages of Europe not understood by the children? Therefore, the teaching of the natives should be bilingual: the first language obviously being their own, the second, either English or French depending on the language in use by the white community living close by. Only when we shall have the desired native teachers will we obtain effective results. There are already-existent and eloquent examples to justify such a plan. One day, when travelling into an inland post by plane, I carried with me mail for the natives. Among the letters, there were about thirty written to their parents by young Indians away from home at boarding school. They were written in a language that their parents could not understand although all could read their native tongue. Having with me an Indian interpreter from elsewhere, I had first to translate aloud these letters to my interpreter who in turn translated them into the local dialect. No doubt, to their advantage, natives must talk the European language in use in their area. However, it is not our task to help them to abandon their own language.

The most urgent task in native education is to have some specialized school where those who have the customary curriculum of a normal school will learn some ethnology as well as some of the rudiments of the native language where they intend to work. Nevertheless, white teachers will always be a "second best". We should strive to select the natives themselves who are suitable material to become teachers in their own community. In undertaking to educate a primitive group, we must strike at the higher levels. The training of a score of such teachers is more urgent than giving thousands of young natives an education in a language they don't understand, and of introducing them to customs which for them make no sense at all.

In one school I know about, all the native children had the same program as in the other schools of the province. They were taught, if you please, that they must not cross the street when the traffic light is red. The only drawback was that there were no roads in their territory. The curriculum must be adapted to the conditions. Generally speaking, we might say that the ideal program would be a half-theoretical and half-practical one. Reading and writing in their own language, a knowledge of one of the official languages current in the district, elementary arithmetic, some natural history to better understand the surrounding countryside, and religion should be the basis of their theoretical instruction. As for the practical end, it should consist of mechanics, woodwork, hygiene, home economics, adapted to their conditions, and handicraft.

The natives should be integrated into the national pattern of life, but without the loss of their own qualifications. Only when they represent a cross-section of the whole nation, from day labourers to the upper echelons of our society, only then will they really be a part of Canadian life. They will be no longer outcasts. To attain this objective, not only the natives but the white men, as well, must learn.

DID MAN EVER "DOMESTICATE" ANIMALS FROM THE WILD?

One might wonder why it is that Eurasia had so many domesticated animals while primitive America had only four: the dog, the alpaca, the guinea pig, and the half-domesticated turkey. Why were the caribou, the buffalo, the mountain goat or the mountain sheep not domesticated by the Amerinds? To infer that the northern tribes were still at the gathering or hunting stage is no explanation for there were agricultural tribes in America close to territories where these animals roamed. Could it be that the old Eurasiatic tribes had attained a degree of civilization far in advance of that of the North American Indian at the time of the discovery of America? Should we, therefore, conclude that prehistoric man had a secret which has been lost down through the ages? This is often the conclusion reached when someone speculates on the subject.

Domestic animals, no doubt, behave like cultivated plants. All the cultivated plants obtained from the past were mutations. Moreover, these mutations generally, were not discovered by man in his wanderings, but rather offered themselves to cultivation by becoming established on dumps or mounds of disturbed soil around settlements.

One may wonder why the ancestors of many cultivated plants have disappeared and the species often currently known only through its cultivated strains. The reason is probably that with the advance of agriculture, man also extended the area occupied by enemies of plants, mainly parasite fungi. During epidemics, plagues completely destroyed the wild population, while the cultivated forms survived through the storage of seed by man.

A domestic animal is not an animal tamed after considerable and patient effort, but an animal which had within it "hereditary domestic" qualities. Man has never domesticated fauna in the sense usually given to the word "domestication". He has only selected from nature such mutations, which, because of their specific character, could endure the company of man, accept his domination and even mutely demand his protection. In some instances, no doubt, these mutations could never have resisted against the elements or beasts of prey and survived only through man's care. Could sheep for example, exist without human protection? The hypothesis, mentioned above, explaining why the wild ancestor of cultivated plants sometimes no longer exists, is no doubt sufficient to explain the disappearance of a given animal known to us today only through the domesticated strain of the species.

Prehistoric man having long ago adopted "domestic mutations" discovered in nature, we now find in the wild only those animals which are incompatible to human society. The Lapland reindeer (*Rangifer tarandus*) "offered" itself probably to human society, while its near relative, the barren-ground caribou of North America (*Rangifer arcticus*) has too savage a disposition to accept man's company. The zebra has to be tamed with each generation and is never a domestic animal. Yet, we should be on the lookout in the hope of eventually finding in herds mutations having the traits required for domestication. The elephant likewise has to be tamed at each generation, but having some "domestic" qualities, it easily becomes a domestic animal: the species is more or less an intermediary between the wild animal and the truly hereditary domestic one.

Some domestic animals when abandoned in nature, survive. The best example is that of the horse left by the Spaniards during the conquest of Mexico and New Mexico which found in the American southwest a proper habitat wherein to breed. Being a strong animal, it successfully resisted animals of prey. Wild horse ("bronchos") must be tamed to be used by man. But their young, born in captivity become domestic animals without any effort whatsoever and they have only to be trained like the ordinary domestic horse. When they returned to the wild state, they did not lose their hereditary "domestic" qualities.

Man also is essentially a domestic, i.e., a sociable animal, but according to habitat and habits, his behaviour might sometimes be comparable, and that not necessarily to his advantage, to that of a wild animal.

PHYSICAL AND BIOGEOGRAPHY IN CANADA - (MID-1952 TO MID-1954)¹

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Research and publication in physical geography and biogeography has been characterized by its emphasis upon Arctic problems during the two-year period under consideration. Many factors have contributed towards interest in Arctic research, such as the encouragement and support of several branches of the federal government, financial aid from the Arctic Institute of North America, the availability of aerial photographs, and greater accessibility of Arctic areas in contrast to preceding years. In the following survey of research and publication in physical and biogeography, no specific mention is made of the numerous federal and provincial government reports that are not primarily concerned with either field of study, but nevertheless contain a wealth of material on them. To mention only two, there are the excellent publications of the geological surveys and departments of agriculture.

The extensive use of aerial photographs has made it possible for photo interpreters to plot glacial features over hundreds of thousands of square miles and gradually the complex history of glaciation is being deciphered. The movement of ice from the Keewatin centre west of Hudson Bay has been shown to be varying and complicated (Bird, Dean, Downie, Evans and Wilson, Mackay). Ice movement east of Hudson Bay is not resolvable into a simple radiating pattern from a single centre (Douglas and Drummond). Sound evidence has been advanced in favour of the non-glaciation of some of the northern Arctic Islands (Jenness).

The discovery of Ice Islands in the Arctic Sea in 1946 publicised our lack of knowledge of sea ice and a number of critical articles on the Ice Islands have appeared since then in Arctic. In 1953, a field party went to northern Ellesmere Island in order to determine, if possible, the glacier origin of the Ice Islands. Farther south, glaciological and other investigations were conducted by an Arctic Institute expedition headed by P.D. Baird in the Cumberland Peninsula of Baffin Island. The dynamic behaviour of glaciers and an understanding of glacier flow was investigated in the Saskatchewan Glacier, Alberta Project, initiated in 1952 (Meier, Riggsby, and Sharp). In the Lower Fraser Valley of British Columbia, an unusual assemblage of fossiliferous till-like stony clays and associated clays, silts, sands and gravels are considered to be a marine drift (Armstrong and Brown). In eastern Canada, the results of a survey of raised shorelines, the mechanics of uplift, and the problems of interpreting the recessional records have been reported in detail (Lougee, 1953, 1954). In different parts of Canada studies on Pleistocene stratigraphy and a bedrock in relation to ground water have been of importance.

Comparatively little was written on regional physiography even though such reports are greatly needed in Canada. The reason is understandable, because the paucity of data which makes the writing of a regional physiography highly desirable also makes the writing unusually difficult. Although there seems no immediate possibility of a regional physiography being compiled for any large part of Canada comparable in detail to that of Chapman and Putnam's "Physiography of Southern Ontario", nevertheless several research projects on terrain studies were initiated in the 1952-54 period and when the results of these and subsequent studies become available, they will add substantially to our knowledge of the physiographic divisions of Canada. The publication of topographic sheets has been accelerated in recent years, and they have been of immeasurable help in such physiographic studies.

In 1952 the National Research Council established a permafrost research station at Norman Wells, N.W.T. Data on permafrost will prove valuable in the understanding of geomorphic features such as solifluction, patterned ground and pingos; in the study of plant geography; and in relating present and past climates to permafrost conditions.

A Climatological Atlas of Canada (prepared by M.K. Thomas, 1953) is unique in that it was published as a supplement to the Climate Section of the Building Code of 1953. The climates of British Columbia (Chapman) after W. Köppen have been well delimited and described in the Transactions of the Natural Resources Conference of British Columbia - the

¹ Prepared for the Sixth General Assembly of the Pan American Institute of Geography and History, 1955.

annual conference reports are an excellent example of the type of publication that has much information of interest to geographers although not dealing specifically with the geographic field. Monographs covering temperature, precipitation, snowfall, vegetative and frost-free seasons, ice and soil temperatures, and wind and storms have been published for the Prairie Provinces and Northwest Territories (Currie). The topics covered are so broad and varied that their interest goes far beyond that of the climatologist to others such as the agriculturalist, architect, and engineer. The practical application of meteorological and climatological knowledge towards the solution of problems in agriculture, forestry, construction, and so forth is yearly becoming more important. Increased emphasis has recently been given to the study of evapotranspiration in relation to agriculture.

Aerial photographs of eastern Canada have been used for reconnaissance mapping of the vegetation, especially the boreal limit of conifers (Hare). Such analyses have permitted a refinement of existing vegetation maps, a re-defining of vegetation types, and a correlation of vegetation types with climatic boundaries, such as those of Thornthwaite and Miller. Similar studies could profitably be made for arctic and subarctic areas west of Hudson Bay. Far from supplanting detailed field studies, the broad approach of photo interpretation only serves to emphasize the need for such studies. Raup (1954) has set forth a number of important botanical problems that require investigation and at the same time would be of interest to other sciences.

Perhaps one feature of the work achieved during the 1952-54 period worth mentioning was the interdisciplinary cross fertilization that was so much in evidence with climatologists making contributions to plant distributions, botanists to geomorphology, physicists to climatology, limnologists to glaciation and so forth. This is as it should be, and for this very reason, many of the significant contributions to physical and biogeography should be sought in borderline fields such as geology and agriculture in order to make any survey of research and publication complete.

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DEVELOPMENT OF THE RICHELIEU VALLEY

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ABSTRACT

Since the early days of the colonial period, the Richelieu Valley has shared in the formation of the Quebec landscape and has reflected, often quite strikingly, the elements that have been associated with its development. Three graduate geography students associated with the Committee on Physical Planning at McGill University, studied the area in 1951-1952 and presented theses on the land use, historical evolution, and urban development of the valley. These have been traced through six historical periods: pre-1761, 1761-1815, 1815-1839, 1839-1867, 1867-1914, 1914 to the present.

Under the French Regime, virtually the entire drainage area of the Richelieu River, extending from the southern fringes of Lakes George and Champlain to the very gates of the St. Lawrence and Montreal, was a vast "no-man's land". Apart from the forts, the early settlements were limited to the river banks below the Chambly portage, which was connected to Laprairie, opposite Montreal, by one of the first roads built in Canada.

The early British rule brought paradox and profit to the Richelieu. Political ambitions from the south went hand in hand with commercial intercourse, military considerations for the protection of the St. Lawrence were compromised by the ties of the Anglo-Saxon settlements advancing down-valley to meet the older French movement from the St. Lawrence, and the defensive centres of the previous regime at St. Jean, Chambly and Sorel, now became the strongholds of a Loyalist group in a French Canadian rural environment.

The next period saw the first steam railroad in Canada built between Laprairie and St. Jean, recognizing the commercial value of the southern part of the river route, the beginning of the Chambly Canal, and the evolution of urban centres outside the requirements of military protection. Commercial agriculture and local industries witness the maturity of settlement.

By 1867 land occupancy was virtually complete, and the peak in rural settlement had occurred. The institutional fabric of the urban centres developed rapidly in this period, while industry was still of only limited importance. Modern industrialism arose in the next period which also saw a rapid increase in urbanization and declining rural population.

The most recent period has witnessed an accentuation of those ties which have cut across traditional valley relations, and brought the centre of the valley within the orbit of metropolitan Montreal. The urban centres have developed distinctive characteristics, and have their own particular problems associated with their industrial structures and physical morphology. Local agricultural specialization have accompanied these changes. These are representative of tendencies that pervade much of the contemporary Quebec landscape.

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THE ST. FRANCIS TO THE CHAUDIERE, 1830 - A STUDY IN THE
HISTORICAL GEOGRAPHY OF SOUTHEASTERN QUEBEC

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THE PHYSICAL SETTING

From the southern boundary of that section of the St. Lawrence Lowlands lying between Quebec and Trois Rivières, there rises rather abruptly to the south, a typical section of the northern Appalachians. This dissected upland region is traversed in a northeasterly direction by three distinctive ranges of hills, namely, from northwest to southeast, the Sutton, Stoke and Border Ranges. Averaging 1,800 feet in elevation, these hills reach a point of greatest elevation in Mt. Gosford (3,800 feet), a prominent peak of the Border Range. Between the ranges a series of distinctive upland surfaces have been reduced to a rolling and moderately steep relief. Numerous lake basins and residual knobby peaks are typical.

The two major drainage channels of the region, the St. Francis and the Chaudière, both south-bank tributaries of the St. Lawrence, have cut beyond the Sutton and Stoke Ranges to drain the north slopes of the Border Range. At the same time, they provide excellent routeways through the region from the St. Lawrence Lowlands into New England by connecting up with tributaries of the Connecticut and Kennebec Rivers respectively. Two lesser rivers, the Nicolet and the Becancour, rise in the heart of the region and both have cut deeply into the upland surfaces and the Sutton Range to reach the lowlands. Sections of their valleys have proved extremely useful routeways, particularly in the earlier days of settlement, when settlers were moving south from the St. Lawrence Lowlands. These major rivers receive a large volume of water from their many tributaries, most of which have considerable fall and are thus ideal water power sites. In the early days this distribution of water power facilitated the establishment of mills and the movement of agricultural and forest products by water.

The whole of the area has undoubtedly been subject to glaciation and today the greater part of the area is covered with glacial till which varies in depth from a thin veneer to several feet. Glacial outwash deposits are scattered along the valleys of the principal rivers and in several areas overlie lacustrine clay, which is often many feet deep. The latter deposits occur at the surface to a limited extent. In many of the river valleys, flat flood plains formed of fine and coarse sands are quite extensive and suitable for agriculture. The strongly rolling phase of most soils is very stony and on the high ridges outcrops and glacial boulders are common, often rendering the land entirely unsuitable for cultivation.

The soils of the region differ considerably in their productivity and in their suitability for the crops that have been grown in the region. The Greensboro loams are today the most extensively cultivated soils of the region. They are best suited to grain and hay crops, but will also produce fair crops of potatoes, corn and roots, thus it is possible to practise a more diversified rotation on these soils than on most of the others. This latter fact is significant in explaining the success of the diverse, subsistence agriculture that was so typical of the earliest period of settlement. The light sandy loams that are so widespread are suited to potato growing in particular, but unfortunately potato growing has not always been restricted to these soils. During the heyday of potato cultivation, between approximately 1820 and 1840, many soil types were utilised regardless of their suitability. In fact, throughout the first half of the 19th century, there was very little selection of soils by the average farmer. Generally, only the most accessible soils were cultivated. In the main river valleys, the accessible soils, though generally fertile, were suited to specific crops, rather than a diversified rotation. The sandy loams so suitable for potatoes were not the best soils for grain and hay crops, but because they tended to occupy the upland surfaces and ridges which were followed by many of the early roads, they were the most accessible and thus were among the most extensively cultivated.¹

¹ The information on the soils of the western half of the region under discussion was obtained from Cann, D.B. and P. Lajoie. Soil Survey of Stanstead, Richmond, Sherbrooke and Compton Counties in the Province of Quebec, Technical Bull. 45, Canada, Dept. of Agriculture.

REGIONAL NAMES

There is no commonly accepted regional name for the whole of the area under discussion. The region falls within the Eastern Townships of Quebec, actually occupying the north-eastern two-thirds.¹ However, there are a number of long-established minor regional or district names that will be used in the description to follow. The "Beauce" is approximately the region drained by the Chaudière River and its tributaries. It includes the middle and upper Chaudière Valley as well as the physiographic region known as the Beauce Plateau. The Chaudière Valley is often used as a regional name to designate the sections of the Beauce Plateau immediately adjacent to the Chaudière Valley, as well as the valley itself. "Bois Francs" is the region originally of hardwood forest, that extends across the Piedmont (a term first used by Raoul Blanchard to refer to the transitional zone between the lowlands and the uplands) out on to the lowlands, comprising approximately the townships of Blandford, Bulstrode, Warwick, Stanfold, Somerset and other parts of the counties of Megantic and Arthabaska.² The "Stanstead Plain", another distinctive physiographic feature, was one of the first regions in the townships settled, so that the name has since been widely used. Finally, the name of the major river valley in southeastern Quebec, the St. Francis, has probably been the most widely used of all regional names.

THE LANDSCAPE - 1830

To the historical geographer, a study of the settlement and development of this Appalachian region of southeastern Quebec is singularly rewarding, for in the transformation of the primeval landscape, the contributions of various groups of people, American frontiersmen and Loyalists, French Canadians, and Irish, Scottish and English immigrants have been quite distinctive. In the year 1830 only two of these groups, the Americans and the French-Canadians were present in the region in considerable numbers.

The Americans were the dominant group, numbering approximately 16,000. Their settlements extended from the border, across Stanstead Plain, along the shores of Lake Memphremagog into the St. Francis Valley to the edge of the St. Lawrence lowlands and north along the track that later became the Gosford Road, into the heart of Megantic County. The flow of American settlers reached a peak in the year 1830 and rapidly decreased during the following two decades. Prior to 1800, commencing actually in 1783³ when the first squatters appeared on Hall Stream, a branch of the Connecticut River, the settlers were both typical frontiersmen and United Empire Loyalists, the latter entering Canada rather surreptitiously, since the Canadian Government was at that time trying to direct them elsewhere in Canada. This early group of settlers had a significant effect on the development of the landscape of the region, for it was due to the pressure that they applied on the Government that there was included in the Constitutional Act of 1791 a clause providing that subsequent land grants in Lower Canada might be made in seigniorial tenure or in free and common socage, the latter being the form of tenure to which they were accustomed.⁴

From 1800 to 1830, southeastern Quebec was essentially an American frontier. The settlers moving north during this period were often described as Loyalists and have since been termed Loyalists by many historians, but the majority were typical frontiersmen in search of new land. Thus by 1830 one could trace in the landscape of the region, many features typical of American frontier settlements.

¹ For a definition of the Eastern Townships, see Putnam, D.F. (Ed.): Canadian Regions, Dent, Toronto, 1952, Chapter 9, pp. 194-195.

² Blanchard, R.: Le Centre Du Canada Français, Beauchemin, Montreal, 1947, Pl. XXII - pp. 186.

³ Channel, L.S.: History of Compton County, Channel, Cookshire, 1890.

⁴ The Report of the Earl of Durham, 3rd Ed. Methuen, London, 1922, p. 80. The total population of the region in 1830 was approximately 35,000.

The French-Canadians in 1830 were the second group in the region, forming approximately a third of the total population. They were largely confined to the seigniorial settlements along the lower and middle Chaudière Valley, but by 1830 they had begun to expand on to the western fringe of the Beauce Plateau and were at the same time entering the Bois Francs country from the rather densely settled Nicolet and Yamaska seignories. No permanent settlement was made in the latter region until 1832.¹ A few French-Canadian families were living in the village of Sherbrooke in 1830, but there were none located in either Megantic or Stanstead Counties.

The Irish were the second largest English-speaking group, but though they had by 1830 advanced from the counties of Dorchester and Beauce in the northwestern part of the region, along Craig's Road and the Gosford Road into Sherbrooke County, their numbers were small compared to the Americans. However, they were particularly significant in aiding early French-Canadian settlement in the heart of the protestant communities of the townships. One of the many hindrances to French-Canadian expansion prior to 1830 was the difficulty of establishing and maintaining a Roman Catholic church in an English-speaking, protestant community, but once the church was established by the Irish Catholics, French-Canadians often followed. For example, we find that in 1833, only 10 years after Irish Catholics settled in Eaton Township, Sherbrooke County, several French-Canadian families arrived.

A fourth group, Scottish emigrants, had just arrived on the scene in 1830. They settled in Inverness Township, Megantic County. Finally, small numbers of English and Scottish settlers who had originally settled in other parts of Canada, were already established in the St. Francis Valley by 1830.

It has already been stated that 1830 was the year in which the northward flow of American settlers reached a peak. Colonisation from the British Isles now became the more significant. This change was one of the effects of the war of 1812, for the government of Lower Canada now looked more to Great Britain as a source of colonists to bar the southward expansion of the French-Canadians.

SETTLEMENT PROBLEMS

Typical of frontier settlement in the 19th century was the large landowner, the absentee landowner, and the speculator. It can be argued that the large landowner had an important role to play in frontier settlement, for he provided an opportunity for the labourer who wished to accumulate sufficient capital to buy land. He probably constructed the grist mill or the saw-mill that was beyond the means of the small landowner. If he entirely fulfilled his obligations, he would have assisted in the construction and maintenance of roads through the region. Only under these conditions could the large landowner be justified; the absentee landowner and the speculator, never.

About the turn of the 18th century, a group of Englishmen and Scots in Lower Canada, comprising executive councillors, governors, Quebec and Montreal merchants and others acquired for themselves large sections of, or complete, townships. The majority had no intention of settling on the land, but merely held it for speculation. It has been estimated that within the whole of the Eastern Townships, between 1793 and 1811, more than 3,000,000 acres of public lands were granted to about 200 persons, some of whom obtained from 60,000 to 80,000 acres each.² The law at the time stated that no individual was to be granted more than 1,200 acres.³

In the year 1830 we find an almost continuously forested belt extending across the northern half of the region from the St. Francis to the Chaudière, even though most of the townships had been granted 30 or 40 years previously. Two roads, Craig's Road and the Gosford Road, had been constructed through the heart of this region, but because of large, undeveloped holdings, absentee owners and the high price of land, as well as the inconvenience of scattered crown and clergy reserves, very little land had been cleared and the roads were in an extremely poor condition.

¹ Mailhot, Ch. E.: *Les Bois Francs*, Compagnie d'Imprimerie d'Arthabaskaville, 1914, I, p. 115.

² *Annales statistiques de Québec*, 1915, p. 267.

³ *The Report of the Earl of Durham*, *op. cit.*, p. 160.

In the centre of this region, in Chester Township, there was in 1830 a population of only ten scattered along Craig's Road. Bouchette,¹ describing conditions as they existed in 1830, says of Chester Township, "This township had great advantages in point of locality with a soil, in every respect, fit for all the purposes of agriculture though still remaining unbroken by the plough". Half of Chester Township as well as sections of several other townships in Megantic County (a total area of 57,000 acres) was at this time owned by members of the William McGillivray family,² who were typical absentee proprietors and land speculators. The other half of Chester Township was granted to officers and privates of the Canadian militia who has served in the war of 1812, but very few of them ever settled in the region, or they abandoned the land soon after settlement. With them often went the titles to the land, so that subsequent settlers on the land, being unable to locate the title and thus purchase the land legally, became squatters.

Squatting, resulting from the aforementioned circumstances, also occurred on the large landholdings and the clergy and crown reserves, and generally resulted in an inferior type of farming. As most of the squatters realised that their occupancy would be temporary, the land was 'butchered' in the full sense of the word. Any improvements made on the property, e.g., fences, farm buildings, etc., were confiscated without compensation by the owner, who usually kept the price of land far beyond the means of the squatter. The earliest squatters in the townships were the first American settlers, but by 1830 they were chiefly French-Canadians. Many of the French-Canadian squatters evicted from land in the townships started the flow of emigrants into New England, a movement which continued throughout the 19th century.

Colonisation - By Bush Track, Road and Water

By 1830 colonisation roads formed the major routeways within the region (see Figure 1), but in certain areas bush tracks, rivers and lakes were utilised. The major roads followed old Indian trails along the St. Francis and the Chaudière Valleys, but subsequent roads, particularly across the upland surfaces, were surveyed by government surveyors. The latter roads almost invariably followed the upland ridges, often at elevations above 1,500 feet. Even though the ridges were generally areas of stony, light soils, road construction and maintenance was easier, and here were the hardwood forests, source of potash and maple syrup, two of the mainstays of the early economy.

From the earliest days of the American penetration into the region, Lake Memphremagog was an important routeway. Linked with the St. Francis Valley by the Magog River and Lake Magog, it formed one of the major connecting routes between the St. Lawrence Lowlands and upper New England. The river sections of this waterway and the other rivers within the region were rarely navigable for more than 10 miles at a stretch. However, for over 50 years from the turn of the century, considerable use was made of the St. Francis below Lennoxville and the lowland sections of the Nicolet and Becancour Rivers by scows and barges of various types.

Colonisation Roads - 1830

In the history of road construction 1830 was again significant, for in that year two of the major colonisation roads of the first half of the 19th century were completed. The Kennebec Road, which had been dreamed of by Talon, because he feared the isolation of Quebec in winter, was completed during the summer of 1830.³ Quebec was now connected to the Atlantic ports of Portland and Boston. The Kennebec Road followed the east bank terraces of the Chaudière to the junction of this river with the Rivière du Loup, the east bank of which it followed to the border. The completion of the road enabled an increase in the flow of cattle, fish, poultry and

¹ Bouchette, J.: A Topographical Dictionary of the Province of Lower Canada, Longmans, London, 1832.

² Caron, I.: La Colonisation de la Province de Québec - Les Cantons de l'Est 1791-1815, Québec, 1927, pp. 168-169.

³ Bouchette, J.: op. cit.

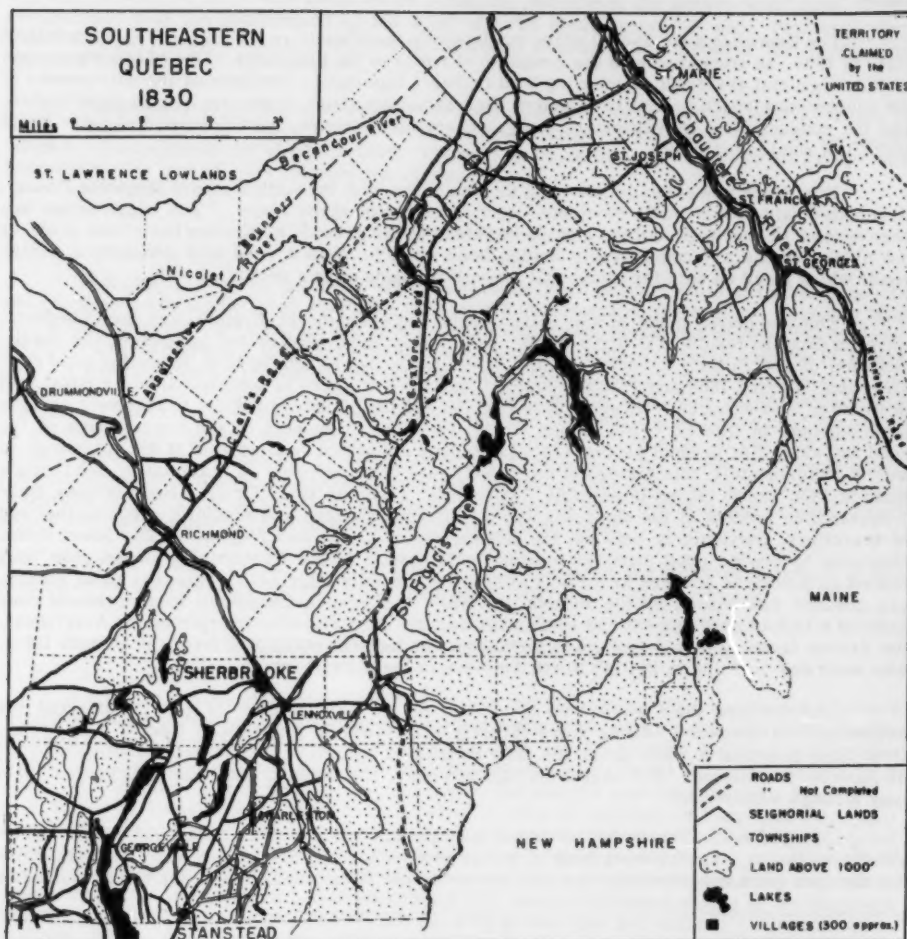


Figure 1. Southeastern Quebec 1830. The information on roads and villages was obtained from (i) "A map of the Eastern Townships of Lower Canada, drawn principally from actual survey for the British American Land Company" by A. Wells, published 1832, and (ii) "A Topographical Dictionary of Lower Canada" by J. Bouchette, *op. cit.* The term 'not completed' indicates roads not yet available for both winter and summer use, but generally for winter use only.

honey, etc., from Maine to Quebec. The Quebec market was thus not only provided with cheaper food, but the province also benefited from the collection of duties. At the same time the inhabitants of the Beauce were able to supply the timber workers of northern Maine with certain food supplies. It is significant that later, when the trade with Maine declined the Kennebec Road became a major French-Canadian emigration route into New England. Following the recently completed road, French-Canadians settled in the valley of the Rivière du Loup at St. Côme (approximately 10 miles south of St. Georges) in 1830, but 10 years later they had all departed for Maine.¹

The Kennebec Road and all other roads within the Chaudière Valley were in an excellent state in 1830, as compared with the condition of roads in the townships. One of the advantages of the seigniorial system in pioneering land is here illustrated. Because of the narrowness of the concessions which generally extended back from the river, approximately at right angles, and the concentration of settlement along the seigniorial roads, each farmer had but a short stretch of road to maintain.

Two roads now existed connecting the Chaudière with the settlements of Megantic County. Bouchette² said of a recently completed section of one of these roads, "The whole extent has been opened 12 feet wide and the stumps cut close to the ground; no ditches have been made at the sides nor has any considerable bridge been made". Such a road was obviously a winter road, which could be said for almost all the upland roads at this period.

The two major roads of the upland region between the St. Francis and the Chaudière, were the Gosford Road and Craig's Road. Both roads were constructed in spite of the determination of the French-Canadians of the lower house not to appropriate funds for road construction. During 1809 and 1810 Sir James Craig used soldiers to complete Craig's Road just in time for food supplies from upper New England and the Stanstead region, to relieve a serious food shortage in Quebec.³ Sir James Craig, speaking in support of the construction of the road had said, "At present all that tract is as little connected with us as if it did not belong to us".⁴ Unfortunately, this statement might well have been repeated 20 years later, for Craig's Road in 1830 was in places impassible. Bouchette⁵ reported that "Craig's Road is very little frequented on account of the obstacles which numerous swamps and windfalls throw in the way of travellers, particularly between the settlements of Leeds and Shipton". The lower house continued to oppose road construction and maintenance in the Eastern Townships, for they feared an American advance to the St. Lawrence, especially after 1812. This fear of an American advance was shared by the British, but while the French-Canadians in government considered a lack of development and settlement was the most effective barrier to the Americans, the British favoured a policy of colonisation, particularly by emigrants from the British Isles, who were now arriving in British North America in large numbers.

The Gosford Road which was completed in the late summer of 1830, connected the settlements of Megantic County more directly with those in Sherbrooke County, and for the first time provided a route from the Hall Stream, a branch of the Connecticut River, to the St. Lawrence Lowlands. For over a decade, however, the Gosford Road was to remain at best only a rough winter road.

Along the St. Francis Valley below Lennoxville the east and west bank roads varied greatly in quality. On the west bank a winter road connected Sherbrooke and Drummondville, but the east bank road was shorter and did not reach Sherbrooke. At a point about 15 miles

¹ Blanchard, R.: *op. cit.*, pp. 365.

² Bouchette, J.: *op. cit.*

³ Christie, R.: *History of the Late Province of Lower Canada*, Montreal, 1866, VI, pp. 129.

⁴ Christie, R.: *op. cit.*, pp. 129.

⁵ Bouchette, J.: *op. cit.*

north of Richmond, a partly constructed road branched off to the north to connect the St. Francis Valley more directly with St. Gregoire, a seignorial village on the south shore of the St. Lawrence opposite Trois Rivières. This road crossed the Nicolet River twice, but up to 1830 no bridges had been built. During the winter months in particular, the bulk of the potash exported from the region was transported along this road to Trois Rivières.

The many roads which formed a fairly dense network between Sherbrooke and the border, were generally in a very much better condition, because of the denser population. Communications with the settlements to the west of Lake Memphremagog were, however, very poor. In fact, settlers in Sherbrooke and Stanstead Counties often crossed the border into Vermont before travelling westward.

In summary it can be said that southeastern Quebec lacked good colonisation roads in 1830. Most of the roads were winter roads only and lengthy sections of some of the major roads were completely out of use in 1830. There is no doubt that settlement by all groups was hindered by the lack of good colonisation roads.

NAVIGATION - 1830

Throughout the early period of settlement much more potash, grain and other products and supplies were transported over land than on the waterways of the region. Frequent falls and rapids prevented the extensive use of any rivers within the region, but because the St. Francis River and its tributary, the Magog River, connected Lake Memphremagog with the St. Lawrence, it was developed as a significant waterway during the first half of the 19th century. Between Lake Memphremagog and the St. Lawrence there are at least five major obstacles to navigation, but in spite of them barges and scows were transporting an increasing tonnage of all goods in 1830. Where the Magog drops sharply into the St. Francis, at the site of Sherbrooke, goods were transported from one lot of boats to another, but on the St. Francis wherever portaging was necessary scows were moved on wooden-wheeled trucks.¹ At the head of navigation on the St. Francis River, Lennoxville developed as a boat building centre, scows and 60-foot barges being constructed chiefly for the potash trade.

The Nicolet and Becancour Rivers were navigable from the northern boundary of the uplands to the St. Lawrence River. They were never very important waterways.

LANDSCAPES OF SOUTHEASTERN QUEBEC - 1830

A traveller journeying from Quebec to Stanstead in the year 1830 would probably have recognized several centres or foci of clearance and settlement, namely the Chaudière Valley, Megantic County, Shipton Township (east of Richmond), the St. Francis Valley (including the Drummondville settlement) and the Sherbrooke-Stanstead region. In all areas the cleared land rarely extended far beyond the colonisation roads, lakeshores and river banks. Even in the more advanced areas such as the Stanstead Plain, halves or quarters of townships were still being held by speculators. Beyond these partly cleared areas there existed a densely forested upland terrain, across which were scattered but a few isolated forest clearings. All of these regions of settlement within southeastern Quebec could have been distinguished by any one or a number of landscape features. All the settlements were at different stages of development so that the state of forest clearance varied as well as the type and number of houses, farm buildings, mills, potasheries, etc. The dominance of one group of people or the other also influenced many features of the landscape.

Settlement on Stanstead Plain was about thirty years in advance of settlement in Megantic County so that the log cabin and tree stump cultivation so typical of the pioneer 'front' was not so typical of Stanstead Plain in 1830. On many farms in Stanstead County the greater part of the forest cover had been removed, stumps had already disappeared, permanent pasture had been sown, gardens and orchards developed and farm buildings erected. In Megantic County, particularly along the banks of the Becancour River, a considerable number of recently arrived settlers were sowing their first crops in rough clearings, living in tents and putting in what little spare time they had on the improvement of roughly formed roads.

¹ Bouchette, J.: *op. cit.*

The most striking contrast within the region, however, existed between the predominantly French-Canadian seigniorial settlements of the Chaudière Valley and the American frontier region within Stanstead and Sherbrooke Counties. Joseph Bouchette and other travellers through the region contrast the American frontier-style farm buildings and agricultural practices developed against the backdrop of a township survey, with the more mature seigniorial landscape so typical of the Chaudière Valley and of the greater part of the St. Lawrence Lowlands.

There is no doubt that the use of the township survey system within the Eastern Townships and the use of the seigniorial or long-lot survey system in the Chaudière Valley resulted, at least during the 19th century, in a contrasting pattern of forest clearings and settlement.

Although a much greater area of land had been cleared in Sherbrooke and Stanstead Counties of the region, there was certainly no regular pattern of forest clearance. Settlers kept close to the colonisation roads which generally followed the ridges and rarely paralleled the survey lines. Except in the most densely settled parts of Stanstead Plain, forest clearings were rarely contiguous due to the scattered clergy and crown reserves and the land being held by speculators.

In the Chaudière Valley seigniorial grants had been made on condition that a road would be built within each seignory along the banks of the Chaudière River, in the hope that Quebec would eventually be connected with the border of Maine. As a result, concessions were generally granted in the seignories in order from north to south so that there was a fairly orderly advance in forest clearance along the valley. This does not mean that in 1830 there was a continuous stretch of cleared land along both banks of the Chaudière, for certain concessions had never been conceded because of the roughness of the terrain or because they were being held in reserve for the children of influential families of the parish, who were evidently preferred to strangers.¹

SEIGNIORIAL SETTLEMENTS

Wherever land was occupied in the Chaudière Valley settlements were spaced fairly evenly along the roads, which generally followed the first or second terrace above the flood plain of the river. Because of difficulties of navigation in the Chaudière the roads along the valley had become the chief lines of communication. Rarely was settlement as dense as along the banks of the St. Lawrence, which Durham² had described as "a series of continuous villages, which give the country of the seignories the appearance of a never-ending street".

In 1830 Ste. Marie with a population of approximately 300 was the largest village in the valley. Ste. Marie, Ste. Joseph and Ste. Francois were all located on the east of the Chaudière, approximately at the centre of their respective seignories, Ste. Marie, Ste. Joseph and Rigaud-Vaudreuil.³ The southernmost seigniorial division actually consisted of two seignories, Aubert Gallion on the west bank of the Chaudière and Aubert de l'Isle on the east. Villages here developed on opposite banks of the river, again approximately at the midpoint of the river boundary of each seignory. It is significant that in contrast to the village sites of the St. Francis Valley which were invariably located at the junction of tributaries with the main stream or at portage points, the villages of the Chaudière with the exception of the villages of the Aubert Gallion and Aubert de l'Isle seignories were not advantageously located in terms of water power, though there were many excellent water power sites along the valley that were utilised. In 1827 there were actually 39 sawmills and eight gristmills in Beauce County.⁴ Ste. Marie was typical of the seigniorial villages of the period, and Joseph Bouchette⁵ has described the village

¹ Ibid.

² The Report of the Earl of Durham, *op. cit.*, pp. 16.

³ Bouchette, J.: *op. cit.*

⁴ Bouchette, J.: *The British Dominions in North America*, Longmans, London, 1832, I, pp. 350-351.

⁵ Bouchette, J.: *A Topographical Dictionary of Lower Canada*, *op. cit.*

as "the largest and most flourishing on the Chaudière; it consists of 39 houses, including the manor house, two seignorial houses, a custom-house and two good inns; there is also a church with a parsonage house. At the convent, a well-built stone édifice of two stories, 20 to 25 girls are instructed". The church and manor house were invariably the centre of village life.

TOWNSHIP SETTLEMENTS

The villages of the townships, particularly those along the St. Francis-Lennoxville, Sherbrooke, Richmond, Melbourne and Drummondville were generally located on or close to good water power sites. Stanstead and Rock Island also developed around an excellent water power site on the Tomofobia River. Because most of these villages were located on an important routeway between New England and the St. Lawrence Lowlands, they developed into important crossroad and marketing villages.

Sherbrooke, which occupies a site on the banks of the Magog River at the point where it drops sharply into the St. Francis, had developed into the major trading centre of the Eastern Townships. The greater part of the trade that developed with the St. Lawrence Lowlands and New England passed through Sherbrooke either by road or river.

The villages of Stanstead and Rock Island, at the border on the main road to Quebec were both thriving villages in the year 1830. The Tomofobia River which flowed between Rock Island and Stanstead was dammed in 1803 and by 1830 was supplying power for gristmills, sawmills, fulling-mills, cording mills, a paper mill and a number of foundries.¹ The village of Stanstead, a mile to the north of Rock Island, was the major trading centre of the border townships as well as being the location of a number of distilleries, though the heyday of distilleries had not yet been reached.²

The only other villages of note in the region at this time were Georgeville and Charleston. Georgeville or Copp's Ferry was located on the east shore of Lake Memphremagog and commanded the trade of a considerable area on both sides of the lake. In 1830 the ferry across the lake was running three times a day.³ The village would have been of greater importance if only the roads to the east of the lake to Montreal had been kept in better condition for summer travelling. Charleston was located approximately midway on the road from Stanstead to Sherbrooke on the height of land between Lake Massawippi and the Coaticook River. It owed its development almost entirely to the potash trade, for the ridge on which it was located was typical hardwood country.

AGRICULTURE

The rural landscapes of the seignorial lands and the townships varied as did the quality of the farming. The southern townships were merely an appendage of northern New England, an extension of the American frontier so that agricultural practices were identical with those in New England. In the areas still being settled, the hardwood trees were cleared as rapidly as possible for the production of potash and the softwoods, particularly the spruce and pine wherever they occurred in the mixed forest, were sent downstream to the nearest mill. Large numbers of cattle, horses, sheep and hogs were raised for market, the livestock invariably moving on-hoof to the markets of Montreal, Trois Rivières and Quebec. Hay, wheat, oats and potatoes were the dominant crops, but considerable quantities of barley, rye, peas and corn were also grown, the latter characterising frontier agriculture in Anglo-Saxon settlements more than any other crop. Production of corn, however, fluctuated from year to year, because it was close to its northern limit of cultivation. Buckwheat and flax were often grown as first

¹ Hubbard, B. F.: Forests and Clearings. The History of Stanstead County, Lovell, Montreal, 1874, p. 32.

² Ibid., p. 29.

³ Bouchette, J.: A Topographical Dictionary of Lower Canada, op. cit.

crops on new land, and apple orchards and maple bushes were common. The better farmers practised a three or four year rotation, involving grains, root crops, fallow and pasture (timothy and red and white clover).

A rapid turnover of the population so typical of frontier communities, was also characteristic of the townships during the early 19th century. The rapid turnover was partly due to the number of 'professional pioneers',¹ who went into the business of clearing farms which they then sold, and partly due to the many settlement problems already described. The lack of municipal institutions was also a hindrance to development. Durham² stated that, "the Eastern Townships present a lamentable contrast in the management of all local matters to the bordering state of Vermont in which the municipal institutions are the most complete, it is said, of any part of New England".

In the Chaudière Valley, in contrast to the townships, the potash cauldrons were few in number; nevertheless the forests of the region played an important role in the economy of the period. The period from 1810-1840 was characterised by a thriving timber industry, in which pines and cedars were exploited rather than the hardwoods. A much greater area of hardwood forest was retained by the French-Canadian settlers who were rewarded by the development within a few decades of a thriving maple sugar industry. Horses, cattle, sheep and hogs were again typical, but the number of cattle was surprisingly small in comparison with the number of sheep and horses. The large number of horses and the attention given to their breeding was, of course, characteristic of all seigniorial farming in Lower Canada early in the 19th century.³ The French-Canadians were renowned for the quality of the horses they bred, which were predominantly of the Cameraskas breed. Large numbers were exported each year to various parts of northeastern United States. With the exception of horses the number of livestock-on-hoof exported from the Chaudière was small. This fact explains why a large number of cattle in particular, were imported each year from Maine for the Quebec market, even before the Kennebec Road had been completed. In contrast to the townships there was a small acreage of corn but a much higher acreage of barley and tobacco. Yields of hay were high, for in many parts of the valley the river-flat meadows were extensive.

It is much more difficult to actually evaluate the quality or efficiency of the farming in the two areas. Bouchette⁴ in describing the landscape of the townships refers to "cornfields of unrivalled luxuriance, thriving farms and flourishing villages", and throughout his descriptions of townships and counties he praises the appearance of farms, crops and livestock. In reference to the seignories of the Chaudière he merely stated that they were in an "advanced and flourishing condition".⁵ There is no doubt that farming generally was more productive in the townships per unit of labour and that generally the quality of agriculture was superior among the Anglo-Saxon farmers. (See Figure 2). The latter is conceded by Raoul Blanchard,⁶ who states, "Il est certain que tout au long du XIX^e siècle les colons britanniques des Cantons étaient des agriculteurs plus ouverts, moins routiniers que les paysans canadiens". It is doubtful though, whether agriculture in the townships was as uniformly efficient and superior as Bouchette and others suggest it was. R.L. Jones, in his extremely valuable "History of Agriculture in Ontario 1613-1880", describes the American frontiersmen and Upper Canadians as 'land butchers'. He considered that the majority were of the 'professional pioneer' type, practising an extensive agriculture and utilising husbandry methods as poor as those of the French-Canadians of Lower Canada. There probably was the 'butcher' element in the townships, particularly along the 'front' which was never as clearly defined as in southern Ontario.

¹ Jones, R. L.: History of Agriculture in Ontario 1613-1880, University of Toronto Press, Toronto, 1946, p. 54.

² The Report of the Earl of Durham, op. cit., p. 80.

³ Jones, R. L.: op. cit., pp. 37.

⁴ Bouchette, J.: The British Dominions in North America, op. cit., p. 308.

⁵ Bouchette, J.: A Topographical Dictionary of Lower Canada, op. cit.

⁶ Blanchard, R.: op. cit., p. 262.

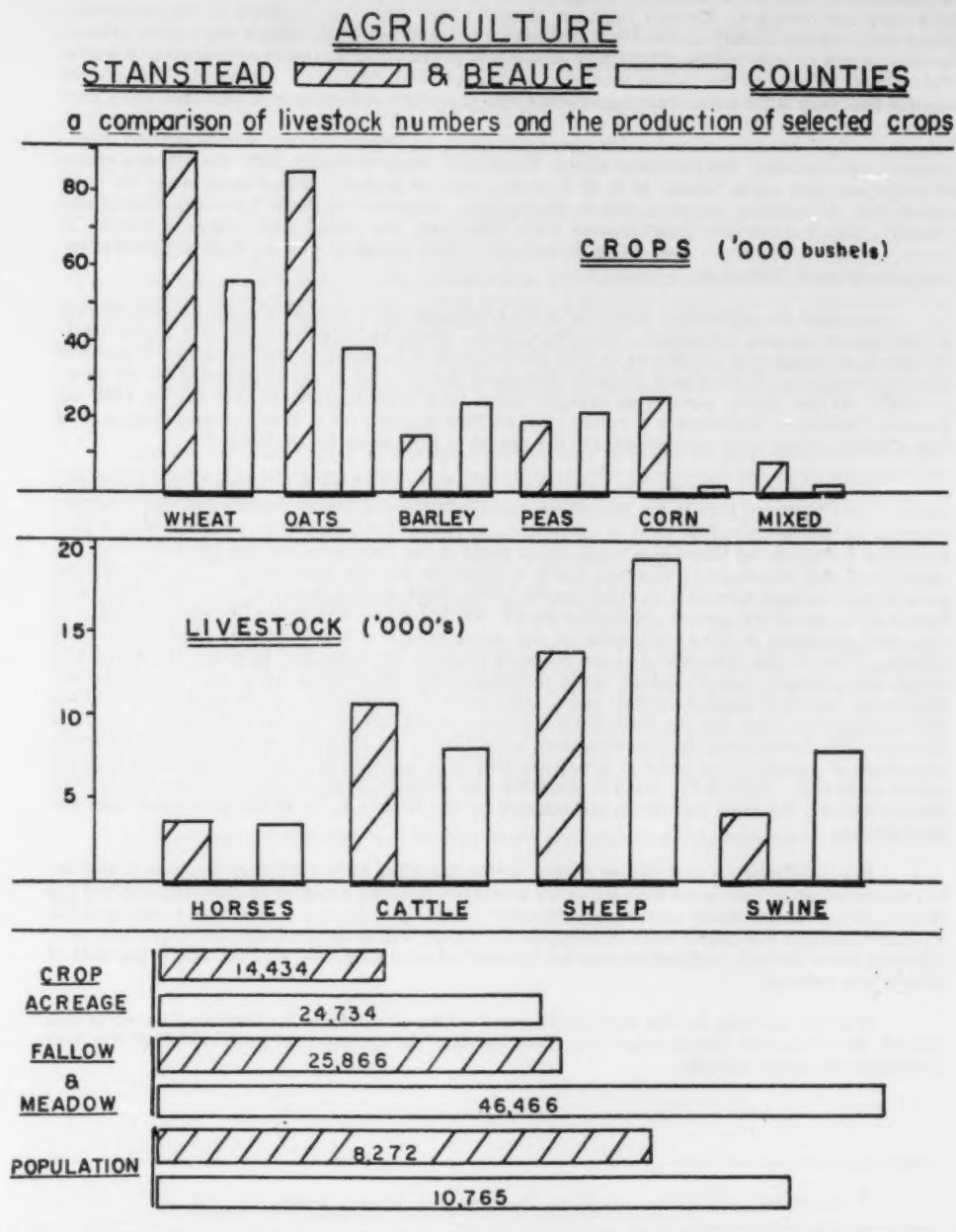


Figure 2. Agriculture and population, Stanstead and Beauce Counties, Quebec, circa. 1830. All data represented in the above diagrams was obtained from statistical statements of the province of Lower Canada published during 1827 and 1829, and later republished in J. Bouchette's "The British Dominions in North America", *op. cit.*, pp. 350-353 and pp. 366-367.

A considerable number of farmers, though probably not a majority, practised either no rotation or a very poor rotation. Certain farmers planted either wheat or potatoes in the successive years while others merely avoided two successive crops of one kind. Weeds were often allowed to take over during the fallow, which gave to much of the cultivable land an appearance of waste. This characteristic of the fallow was also typical of most seigniorial farmland. The poorer farmer had very little understanding of soils and therefore selection of a soil type for a particular crop was rare. Nevertheless, within the more advanced townships, e.g., Stanstead, Shipton, a high standard of husbandry was maintained. In Shipton County, where British immigrants were probably the dominant group, Bouchette¹ reports that in 1827 the average yields of crops per acre were: wheat, 15 to 25 bushels; oats, 40 bushels; Indian corn, 40 to 50 bushels; barley, 40 bushels; potatoes, 200 to 300 bushels. However, in Eaton Township (Sherbrooke County), where American frontiersmen were dominant, the yields were lower:- wheat, 15 bushels; oats, 20 bushels; rye, 15 to 20 bushels. This township was as well-endowed physically as Shipton Township.

Amongst the majority of farmers in the townships there was developing an appreciation of the value of animal husbandry. Breeds of cattle, sheep and hogs were all of a higher quality than in the seigniorial lands and by 1830 the breeding of horses was also becoming important. The Durham breed of cattle was probably dominant, but Ayrshires were appearing on the scene by 1830. Merino sheep were first brought north from New England in 1816 and by 1830 the Eastern Townships had become a major rival of New England as a sheep raising region.² In 1825 Cheviot sheep were introduced into the region at Cookshire by M. Pope.³

Though it is considered that agriculture generally was less productive in the seigniorial lands of the Chaudière than in the townships, the agriculture of the former region was probably superior to that practised on most of the seigniorial lands of the St. Lawrence Lowlands. A factor which favoured the Chaudière above many parts of the Lowlands was the greater variety of relief, soil and forest cover that was likely to occur on any one concession. The concessions were surveyed approximately at right angles to the river so that many of them extended from fertile river meadows, across the well-drained, sandy loams, fine sands and gravelly soils of the river terraces to the clayey soils of the valley slopes and the lighter, stony soils of the ridges. Thus on any concession there might be located the ideal soil type for any number of crops and pasture. Unfortunately these favourable characteristics were not fully exploited. Whilst the French-Canadian farmer gave much more consideration to the conservation of his forest resources than did the Anglo-Saxon farmer of the townships, he was not as capable a farmer. The agricultural implements used were crude. In 1830 he was still using an ancient two-wheeled plough. The rotation practised was of a one-to-four-year variety with half the period in fallow. Most of the manure available was wasted. Many a French-Canadian farmer simply dumped the barn and farmyard manure on the river ice, to be carried away with the spring thaw.

French-Canadian agriculture of this period has often been criticised because it was far too extensive when compared with the more intensive farming systems of New England and the British Isles. In the thinly settled and recently opened up regions the extensive farming of the French-Canadian was much more economical of labour, but as an area was developed and concessions were divided, cultivation was not intensified sufficiently so that the output per unit of labour was reduced.

If it had not been for the ingrained conservatism of the French-Canadian farmer of this period, the Chaudière Valley might well have equalled the agricultural productivity of the best farmlands of Lower Canada.

¹ Bouchette, J.: A Topographical Dictionary of Lower Canada, *op. cit.*

² Jones, R. L.: *op. cit.*, p. 50.

³ Minville, E.: L'Agriculture Etudes Sur Notre Milieu, Editions Fides, Montreal, 1943, p. 205.

INDUSTRIALISATION ET STRUCTURE DE L'EGLISE
DANS LE DIOCESE DE TROIS RIVIERES, QUEBEC

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Université Laval

RESUME

Bien que peu connues, les répercussions de l'industrialisation sur les faits de religion dans le Québec sont très profondes. Nous voulons présenter celles qui se rapportent à la structure de certains groupes et institutions, tels la paroisse, les fidèles et les clercs. En géographes, nous avons une préoccupation écologique: nous étudions les structures en fonction de leurs milieux naturel et social. Nous nous en tiendrons au diocèse représentatif de Trois-Rivières. Nous ne nous occuperons que de l'Église catholique et de son évolution depuis 60 ans.

Les 200,000 catholiques de diocèse résident dans la vallée du Saint-Maurice, la plaine laurentienne et les Laurentides locales. L'industrialisation a provoqué une forte augmentation de la population totale (65,000 à 200,000), un accroissement extraordinaire du peuplement de la vallée (10,000 à 132,000), une proletarianisation des diocésains, une urbanisation prononcée (67% en 1952), une augmentation du nombre de catholiques par prêtre (de moins de 1,000 à 1,200), une inadéquation du clerc aux nouvelles conditions naturelles et sociales: le prêtre est fils de cultivateur dans la proportion de 40% et il vient de la plaine ou des Laurentides dans 68% des cas alors que le fidèle réside surtout dans la vallée (65%) et il appartient aux groupes salariaux ou artisanaux (66%). L'urbanisation a aussi accentué les différences entre les situations rurales et urbaines. Les 2/3 des paroisses et la moitié des prêtres engagés dans le ministère se trouvent à la campagne alors que les 2/3 des fidèles sont en ville. À la campagne, la densité des fidèles est faible (20 au mille carré); aucune paroisse n'est trop grosse; seulement 20% des prêtres sont surchargés; il y a 800 catholiques par prêtre. En ville, la densité moyenne est de 10,000 catholiques au m.c.; la moitié des paroisses sont trop grosses; 80% des fidèles vivent dans des paroisses trop peuplées; 85% des prêtres dans le ministère sont surchargés; 75% des fidèles sont desservis par des prêtres surchargés; on compte 1,650 catholiques par prêtre engagés dans le min.

La structure paroissiale de l'Église n'est pas adaptée au nouveau genre de vie.

La diminution de la vitalité religieuse dans les villes ne serait-elle pas reliée à ce fait?



SOIL RESOURCES AND LAND USE HAZARDS IN SOUTHERN ONTARIO

B. C. Matthews

ABSTRACT

Southern Ontario, comprising about 50,000 square miles, provides the bulk of the agricultural wealth of Ontario. The soil resources in Southern Ontario are widely variable as a result of wide variations (1) in glacial drift from which the soils developed, (2) in topography and natural drainage, and (3) in climate. There are eight different great groups of soils, each group having its own peculiarities in regard to agricultural adaptability.

In land use planning, the natural limitations of the land must be recognized. Problems such as inadequate drainage, excessively steep topography, low fertility and moisture holding capacity, as well as excessive stoniness and frequent rock outcropping seriously limit agriculture in certain parts of Southern Ontario. At the present time, only 25 per cent of the area is cropped but it is estimated that the present acreage of crop land could be increased by 20 per cent with proper management to overcome the hazards to cultivation. On the other hand, production could be increased by 50 to 100 per cent, without reclaiming new land, if known methods of good soil management were applied to all farms.

THE HISTORY OF THE UNITED STATES OF AMERICA

BY

WILLIAM

THE HISTORY OF THE UNITED STATES OF AMERICA, FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME. BY WILLIAM, ESQ. OF THE MIDDLE TEMPLE. IN TWO VOLUMES. THE FIRST VOLUME. LONDON, Printed by J. BARNARD, at the Crown and Anchor, in St. Dunstons Church-yard, 1788.

A METHODOLOGICAL CONSIDERATION OF SOME GEOGRAPHIC
ASPECTS OF THE NEWFOUNDLAND
REFERENDUM ON CONFEDERATION WITH CANADA, 1948

William Warntz
University of Pennsylvania

On March 31, 1949, Newfoundland formally entered the Dominion of Canada as that country's tenth province as a result of the voting at the Second Poll of the Referendum held in Newfoundland on July 22, 1948. This election climaxed a long and often difficult period during which Newfoundlanders gave considerable thought to the two alternatives finally offered in a second referendum - namely, responsible government (return to the Dominion status held prior to 1933) or Confederation with Canada as a province of that Dominion.

The Confederationists won the election when they managed to obtain 52.34 per cent of the popular vote.¹

For the geographer, however, much of interest can be discovered when he examines the referendum data and finds that there was substantial areal differentiation in the attitudes of the voters toward Confederation and Responsible Government. For example, the percentage of voters favouring Responsible Government ranged from 84.56 for Ferryland (district XVI on map, Figure 1) to 11.09 for Burgeo-LaPoile (XXI). The reader can examine column A of Part I, Table I to see for himself the considerable regional variation in attitude. The "explanation" of this areal variation is most certainly a fitting task for a geographer.

Before attempting to account for the regional variation, the geographer must first consider whether a problem really exists in the statistical sense. That is to say, the geographer must first ascertain whether the variation he observes is significant and measure it to see what the probabilities are of such a regional pattern's occurring due to random or chance factors alone.

A standard statistical technique which is readily adaptable to such a problem is the chi-square test. This measure is used in testing the validity of a hypothesis and is accomplished by comparing the observed data, expressed as frequencies in various groups, with the expected or theoretical frequencies in the same groups.

The value of chi-square (χ^2) is computed as follows:

$$\chi^2 = \sum \left[\frac{(f_o - f_c)^2}{f_c} \right]$$

letting f_o = actual frequencies

f_c = theoretical frequencies

Let it be hypothesized that there be no regional variation in the attitudes of the voters (the Null Hypothesis). It is thereby assumed that the average for all Newfoundland is also representative of each district's vote which together made up the Newfoundland average.

For all of Newfoundland, 52 per cent of the voters favoured Confederation with Canada while 48 per cent voted for Responsible Government. Knowing these figures and the number of voters by district the theoretical or expected frequencies can be computed so as to be compared with the already given or actual frequencies. Using the figures of 48 per cent for Responsible Government and 52 per cent against as the expected frequencies for each district an analysis was made. Chi-square was computed to be 25.861! Entering the chi-square table

¹ Report of the Chief Electoral Officer Relating to the Second Poll of the Referendum Held July 22nd, 1948. /s/N. Short, Chief Electoral Officer, August 26, 1948.

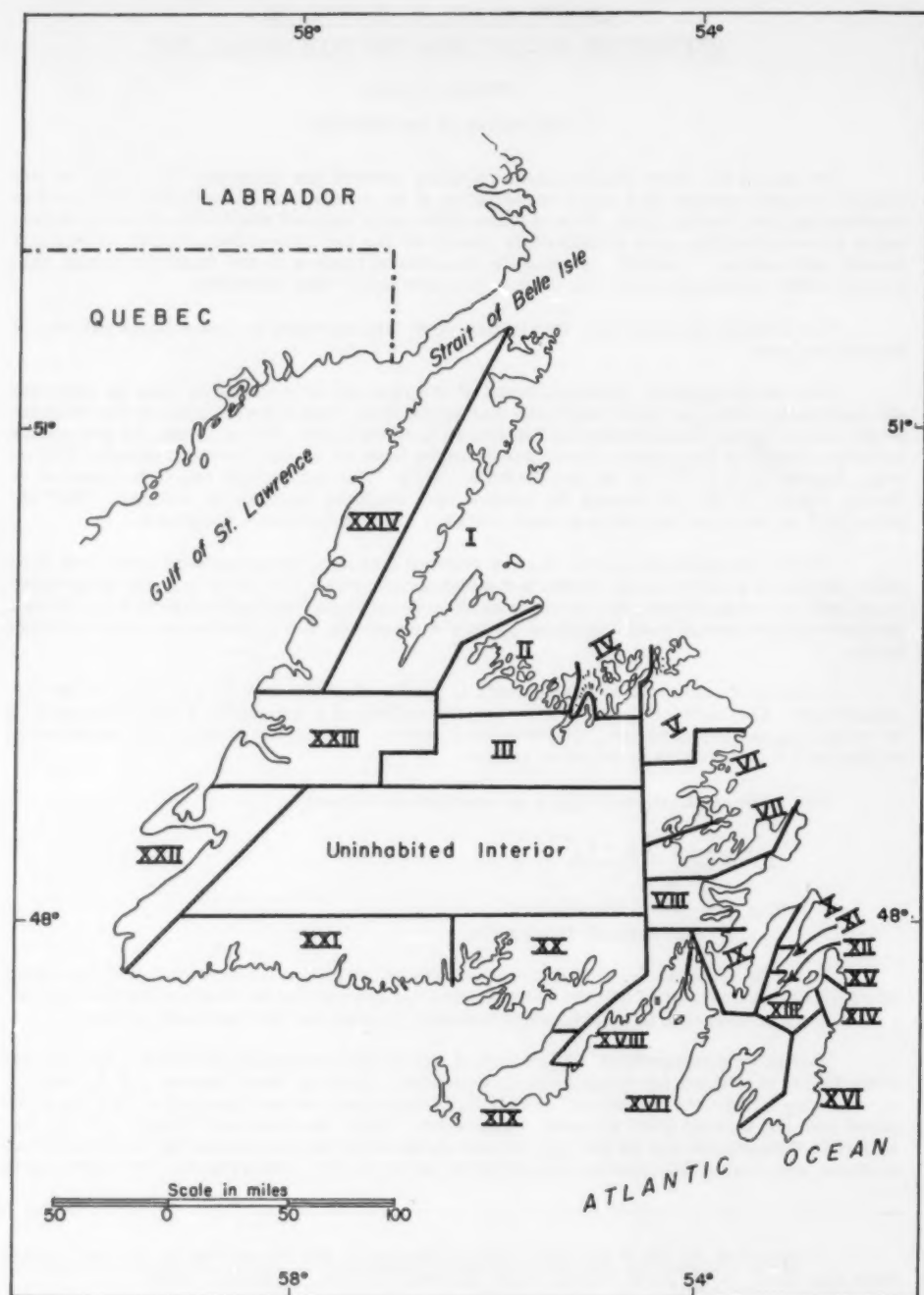


Figure 1. Electoral and Census Districts of the Island of Newfoundland, prior to Confederation. (See Table I for District Names).

with the appropriate number of degrees of freedom (23 in this case) the probability of obtaining by chance or random factors the areal distribution of attitude such as was observed can be found. The .001 level of probability (one chance in a thousand) value for chi-square was 49.278. Hence the smallness of the probability of obtaining by chance the actual vote distribution in Newfoundland is virtually unimaginable. The odds are extremely low - probably billions to one. Hence it is absolutely safe to assume that factors influencing the vote were not everywhere uniform. Geographical variations in significant factors were influencing the voters.

Having thus determined that there did indeed exist a substantial areal variation in attitude toward the Confederation issue and that this variation could scarcely be attributed to chance or random factors alone, the geographer is thus challenged to attempt to discover, if he can, what factors were responsible for such great variation in attitude from place to place.

Both data and method needed to be selected for the problem. The 1945 Census of Newfoundland publications¹ seemed the obvious source for data. (The census was the one immediately prior to the referendum and now, since Confederation, the last one in which the data are available for such areal base units.)

As to method of analysis, statistical correlation techniques seemed most advisable. By adapting correlation methods, the geographer can discover the degrees of areal association in the concomitant variation of several variables. Coefficients of correlation can be computed to indicate this degree of areal relationship. It should be remembered that statistical coefficients show a functional relationship in the mathematical sense only and considerable care should be taken in stating cause and effect relationships. The statistical correlation method does, however, furnish the geographer with a technique whereby patterns of areal associations can be observed to which the geographer can apply his own sense, ability, and intuition in formalizing the principles of geography. Statistical correlation is the social scientist's substitute for the controlled laboratory experiment of the physical scientist. The social and economic world itself is the laboratory of the social scientist and this is a laboratory in which "other things being equal" cannot be obtained. Hence, if the net effect of one variable on another, other factors held constant, is to be ascertained in social science, these other factors can only be held constant by statistical methodology.

But, before any attempt is made to discover the net effect of any factor, by area on attitude, by area in the referendum, some simple or gross correlations should be attempted to discover the broad general patterns of association.

Accordingly, a simple ranking method of correlation was used to measure the apparent or gross uncorrected relationship by area between percentage of voters favouring Responsible Government and each of several other factors.

The formula used was:

$$P = 1 - \frac{6 \sum d^2}{N(N^2 - 1)}$$

letting P = the coefficient of rank correlation,

d = difference in rank for two factors for an area,

N = number of observations or units of association.

The following factors were used by area, all of which except A were obtained directly or indirectly from the 1945 census data:

A = Percentage of district's voters favouring Responsible Government.

B = Per capita income (average per district).

C = Rate of illiteracy (percentage of males over 12 unable to read and write by district).

¹ Census of Newfoundland, 1945, Vols. I and II made available by the Canadian Dominion Bureau of Statistics, 1949.

- D = Percentage of district's population belonging to the Roman Catholic Church.
- E = Percentage of district's population belonging to the Church of England.
- F = Percentage of district's population belonging to the United Church.
- G = Population potential in hundreds of persons per mile (average by district).
- H = Trade employees as a percentage of each district's gainfully employed.

Table I contains the values for each of these factors by district and also the ranking of the districts¹ from lowest values to highest values (i.e., 1-24) for each factor.

All of these factors are more or less self-explanatory except for G (Population Potential). Before discussing the gross relationships found to exist among the factors, it might be prudent to develop and explain the concept "Population Potential".²

For the purposes of social science it may be useful to assume that a population concentration exerts an influence or force which varies directly with the size of the population and inversely with distance from it. This force exists at the population site and beyond losing in intensity as distance increases. The intensity of this "demographic field" could be mapped by a simple contour technique and measured in terms of persons per mile (or some other convenient person/distance units).

But, many population concentrations may exist in a rather uneven distribution over a given area so that the population potential at any given point is contributed to by all persons as they are distributed. In the notation of the calculus the following formula expresses this idea:

$$V_c = \int \frac{1}{r} D dS.$$

letting V_c = potential at any point C in the plane,
 D = surface density of mass (of population),
 dS = the infinitesimal element of area.

Let the integration be extended to all areas of the plane where D is not zero.

Thus, if the manner in which mass (population) is distributed over plane D is everywhere known the potential can be computed at every point. The results can be portrayed on a map of the surface by use of contours of equipotential analogous to contours on the topographic map with the "hills" contoured being those of aggregate population influence or demographic force.

Figure 2 is a Population Potential map for Newfoundland showing contours of equipotential.³ (Geographers familiar with Newfoundland will recognize the influence of the population along the railway.)

¹ Labrador (the mainland part of the present province) was not included in this study. Throughout this paper, Newfoundland shall be understood to mean the Island of Newfoundland.

² This concept was developed by John Q. Stewart of Princeton University as early as 1939. For a succinct statement see his "Demographic Gravitation: Evidence and Applications", *Sociometry*, XI (1948) 31-58.

³ This map was developed using a method of mechanical integration. For details see Stewart, "Empirical Mathematical Rules Concerning the Distribution and Equilibrium of Population", *Geographical Review*, XXXVII (1947) 461-485.

TABLE I
Table of Factors Used by Areas for Analysis of Newfoundland Referendum, 1948

Area No.	Name	Part I Actual Values ¹							
		A	B	C	D	E	F	G	H
I	White Bay	24.19	614	18.7	22.0	30.5	38.0	69.25	3.0
II	Green Bay	28.64	692	20.8	7.8	7.5	50.8	78.78	3.9
III	Grand Falls	43.54	1,348	14.2	26.0	17.6	33.5	222.08	9.8
IV	Twillingate	24.75	652	16.9	2.6	12.6	58.5	93.39	5.7
V	Fogo	38.07	520	16.5	12.1	33.5	42.6	90.69	3.6
VI	Bonavista North	25.51	670	17.7	8.2	38.0	40.0	93.05	3.1
VII	Bonavista South	48.10	568	21.1	15.4	41.5	35.8	101.86	3.5
VIII	Trinity North	34.91	681	13.0	5.0	45.0	44.5	99.18	5.4
IX	Trinity South	39.73	654	14.1	8.2	44.5	32.5	114.06	4.1
X	Carbonear-Bay de Verde	47.29	694	9.7	23.5	9.7	62.5	144.69	5.2
XI	Harbour Grace	62.32	646	14.5	24.0	63.0	11.3	174.52	4.7
XII	Port de Grave	50.95	652	9.3	19.6	38.5	32.0	175.95	5.9
XIII	Harbour Main-Bell Island	82.58	1,010	11.2	57.5	33.0	5.0	312.85	5.7
XIV	St. John's West	66.89	1,354	4.0	51.0	25.0	18.3	819.00	14.5
XV	St. John's East	67.78	1,403	5.2	47.5	25.5	20.8	643.65	13.8
XVI	Ferryland	84.56	615	5.8	97.0	2.1	0.3	152.35	3.0
XVII	Placentia-St. Mary's	81.60	748	9.8	95.0	2.9	1.8	95.24	2.5
XVIII	Placentia West	45.19	614	23.7	57.5	22.0	15.5	87.44	3.2
XX	Burin	15.04	811	13.9	25.0	20.0	40.3	84.63	5.5
XX	Fortune Bay-Hermitage	18.60	752	28.4	25.0	67.5	0.1	81.49	3.5
XXI	Burgeo-La Poile	11.09	848	23.7	0.8	83.0	14.5	74.45	5.9
XXII	St. George's-Port au Port	43.27	881	21.9	76.5	19.4	3.1	82.23	3.5
XXIII	Humber	31.27	1,465	12.8	30.2	35.2	22.0	274.42	8.7
XXIV	St. Barbe	21.20	688	26.0	14.7	68.0	13.7	696.20	1.9

Source: See text.

¹ See text for explanation of letters.

TABLE I - Continued

Area No.	Name	Part II Areas Ranked (lowest to highest) for Each Factor							
		A	B	C	D	E	F	G	H
I	White Bay	5	3.5	17	11	12	17	2	3.5
II	Green Bay	8	13.5	18	4	3	22	4	11
III	Grand Falls	14	21	12	16	6	15	20	22
IV	Twillingate	6	7.5	15	2	5	23	4	17.5
V	Fogo	11	1	14	7	14	20	9	10
VI	Bonavista North	7	10	16	5.5	16	18	10	5
VII	Bonavista South	17	2	19	9	18	16	14	8
VIII	Trinity North	10	11	9	3	20	21	13	15
IX	Trinity South	12	9	11	5.5	19	14	16	12
X	Carbonear-Bay de Verde	16	14	5	12	4	24	17	14
XI	Harbour Grace	19	6	13	13	21	6	18	13
XII	Port de Grave	18	7.5	4	10	17	13	19	19.5
XIII	Harbour Main-Bell Island	23	20	7	20.5	13	5	22	17.5
XIV	St. John's West	21	22	1	19	10	10	24	24
XV	St. John's East	20	23	2	18	11	11	23	23
XVI	Ferryland	24	5	3	24	1	2	15	3.5
XVII	Placentia-St. Mary's	22	15	6	23	2	3	12	2
XVIII	Placentia West	15	3.5	21.5	20.5	9	9	8	6
XIX	Burin	2	17	10	14.5	8	19	7	16
XX	Fortune Bay-Hermitage	3	16	24	14.5	22	1	5	8
XXI	Burgeo-La Poile	1	18	21.5	1	24	8	3	19.5
XXII	St. George's-Port au Port	13	19	20	22	7	4	6	8
XXIII	Humber	9	24	8	17	15	12	21	21
XXIV	St. Barbe	4	12	23	8	23	7	1	1

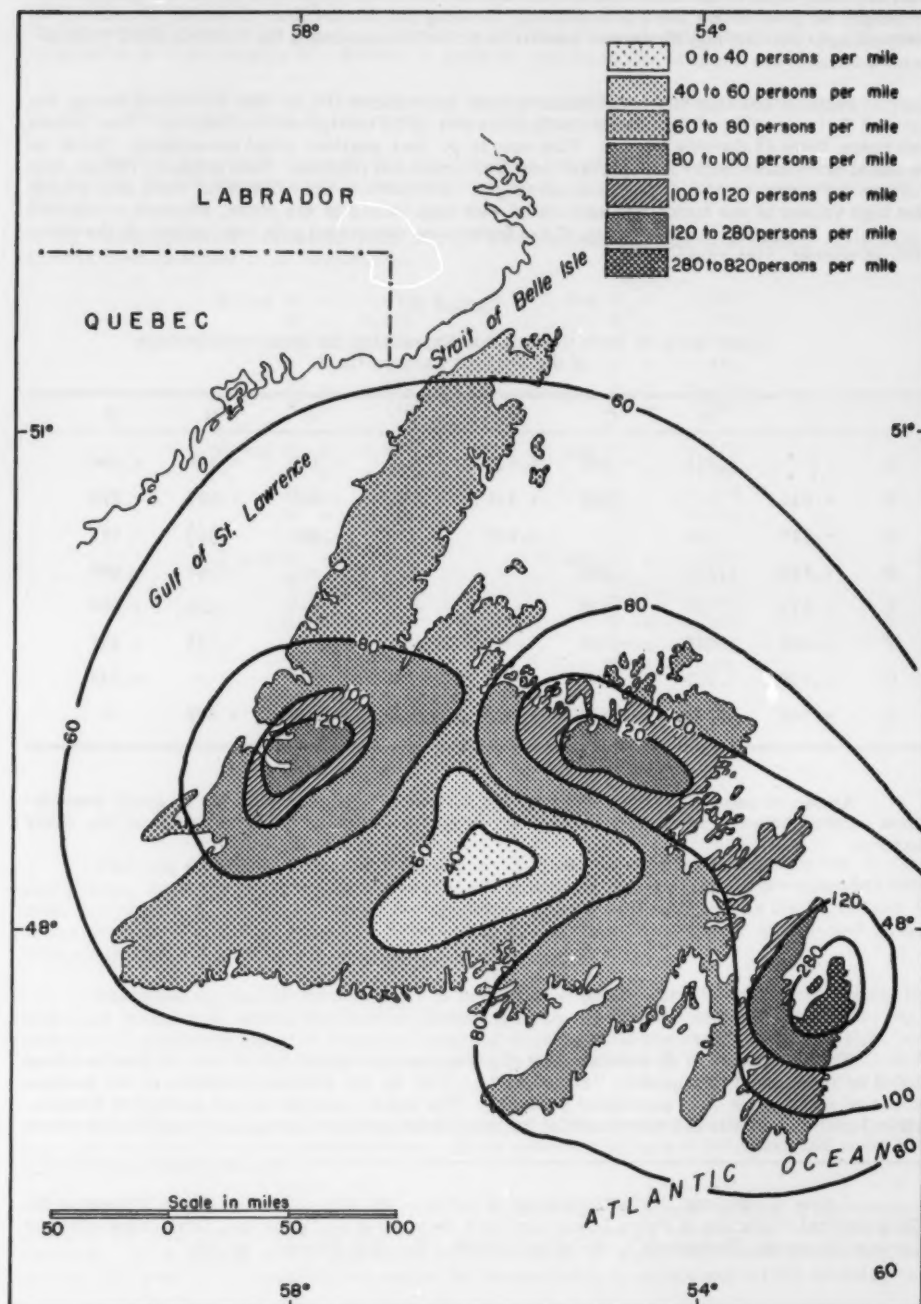


Figure 2. Population potential for the Island of Newfoundland.

Population potential is a measure of the influence of people at a distance and has been demonstrated to be of greater economic and social significance than the conventional measures of population, i.e., numbers and densities.¹ Population potential is a measure of aggregate accessibility of people to a place and conversely a measure of relative isolation. The area with the least value is the most isolated one and the one least influenced by all the interactions of people on people and the corresponding sociological intensities. It would, therefore, be interesting to test the significance of population potential concerning the Newfoundland referendum of 1948.

Table II contains the coefficients of rank correlation (P) as they developed among the several factors. The values of the coefficients are to be interpreted as follows. The values can range from +1 through 0 to -1. Plus one is perfect positive areal association. Zero is no areal correlation and -1 is perfect negative areal correlation. Intermediate values then represent the degree of association accordingly. If a positive correlation is found this means that high values of one factor are associated with high values of the other, whereas a negative correlation indicates that low values of one factor are associated with high values of the other and, of course, vice versa.

TABLE II
Coefficients of Rank Correlation Expressing the Interrelationships
of the Various Factors Used

	A	B	C	D	E	F	G	H
A	--	+.011	-.657	+.628	-.371	-.325	+.716	+.094
B	+.011	--	-.283	+.314	-.110	-.245	+.337	+.578
C	-.657	-.283	--	-.343	+.473	-.058	-.800	-.471
D	+.628	+.314	-.343	--	--	--	+.407	-.053
E	-.371	-.110	+.473	--	--	--	-.124	+.080
F	-.325	-.245	-.058	--	--	--	-.133	+.227
G	+.716	+.337	-.800	+.407	-.124	-.133	--	+.575
H	+.094	+.578	-.471	-.053	+.080	+.227	+.575	--

As can be seen also from Table II, the following gross correlations or areal associations existed between percentage voting for Responsible Government and each of the other factors:

A and G =	.716
C =	-.657
D =	.628
E =	-.371
F =	-.325
H =	.094
B =	.011

This would seem to indicate that the regional variation in the vote in Newfoundland could be most nearly completely "explained" (+.716) by the relative isolation of the various areas of voters, i.e., by population potential. The higher potential areas preferred Responsible Government while the inaccessible, isolated, lower potential areas favoured Confederation

¹ See W. Warntz, "The Geography of Price - An Attempt to Develop a Theory of the Geographical Variation of Price Using Concepts Measuring the Space and Time Dimensions of Certain Economic Phenomena", (to be published). See also Stewart, *op.cit.*

with Canada. The results would also suggest that there is a high correlation between attitude and illiteracy. The high negative value (-.657) given above would indicate that the areas with a low rate of illiteracy favoured Responsible Government, whereas the more illiterate areas voted strongly for Confederation. There is also an apparently high positive correlation (+.628) between percentage of Roman Catholics in the district's population and its preference for Responsible Government. Smaller negative correlations (-.371 and -.325) with the other two major denominations were found. Virtually no correlation at all existed between A and trade employees as a percentage of a district's gainfully employed and also per capita income.

Lack of space prevents the detailed discussion of all the correlations among the various factors. These can be seen by the reader if he will again examine Table II.

Lack of space also prevents the much desired mapping of the areal variation of each of the factors so that the geographical associations can be visualized as well as indicated statistically.

Here, however, in outline form are the intercorrelations that exist among the several factors used individually to "explain" A.

B and H = +.578	C and G = -.800
G = +.337	E = +.473
D = +.314	H = -.471
C = -.283	D = -.343
F = -.245	B = -.283
E = -.110	F = -.058
D and G = +.407	E and C = +.473
C = -.343	G = -.124
B = +.314	B = -.110
H = -.053	H = +.080
F and B = -.245	G and C = -.800
H = +.227	H = +.575
G = -.133	D = +.407
C = -.058	B = +.337
	F = -.133
	E = -.124
H and B = +.578	
G = +.575	
C = -.471	
F = +.227	
E = +.080	
D = -.053	

The task then was to observe the patterns of gross association and divide the factors into groups, each group containing within it factors which are highly intercorrelated but with little correlation among the factors of the different groups. (Note that values for D, E, and F intercorrelations were not computed because these are mutually exclusive groups and spuriously high and statistically untenable figures would have resulted.)

The ideal statistical circumstance of groups of perfectly correlated factors internally with zero correlation among the factors across groups, of course, does not exist. The significance of population potential becomes apparent when the data are examined in this light because of the fact that all the factors are more highly correlated with it than they are with each other in turn.

Nevertheless, for the purposes of this study, it was deemed that the following groupings best satisfied the ideal circumstance. (Each observer is free to interpret and make his own decisions and errors!)

In the attempt to "explain" the areal variation in the dependent variable A (percentage of voters by area favouring Responsible Government) the following independent variables were selected - G, B, and D. G is population potential which is highly correlated (negatively, of course) with rate of illiteracy (C) and stands for accessibility to people and all the sociological

interactions, diffusion of ideas, and other subtleties associated therewith. B is per capita income and although its gross relationship was very low with A, it is also only slightly correlated with the other factors save H (trade employees) with which latter factor it showed a moderately high correlation. Hence B is used as the income-occupation element in the analysis. D represents the percentage of Roman Catholics in a district's population and although it showed a fairly high correlation with A it was only moderately correlated at most with the other factors.

D then represents the possibility of religious denomination as a factor associated with attitude in the referendum.

To develop a coefficient of multiple correlation (R) showing how much of the areal variation in voters' attitudes (the dependent variable) can be "explained" by recourse to these three selected independent variables, a multiple linear regression equation was selected. This formula also permits an estimation of the relative importance of each independent variable separately, the effect of the other variables being held statistically constant, or in the words of the physical scientist "other things being equal". The formula used in this study is of this general form:

$$X_{c1.234} = a_{1.234} + b_{12.34}X_2 + b_{13.24}X_3 + b_{14.23}X_4.$$

As stated above the formula is in the conventional form as used in statistical methodology. In the particular terms of this individual $X_{c1.234}$ is the dependent variable A and X_2 , X_3 , X_4 represent the three independent variables G, B, and D being used to "explain" A. The other components of the formula, $a_{1.234}$, $b_{12.34}$, $b_{13.24}$, and $b_{14.23}$ are all mathematically determined constants. The a constant is the hypothetical value for X, when the three independent variables have a value of zero, or if there were no geographical variation in the intensities of the three independent variables.

The b constants called the Net Regression coefficients indicate the change in X_1 associated with the change in an accompanying independent variable when allowance has been made for the effect of the other independent variables. Hence, for example, $b_{13.24}$ estimates the number of units change in the percentage vote by district for Responsible Government associated with a one unit change by district in per capita income independent of X_2 and X_4 .

Although the various coefficients are called "net" they are so only with regard to the other variables considered. They remain "gross" with regard to all the possible factors not considered or even dreamed of. Such is the complexity of social science!

The actual size of the b constants, of course, varies as to the units in which the variables are stated, but it still furnished a basis for the calculation of the relative importance of each independent variable's effect on the dependent variables separately.

One of these measures of "net" importance is the Beta coefficient or B (including $B_{12.34}$, $B_{13.24}$, and $B_{14.23}$).

Finding the proper values mentioned above requires the computation of the extensions of the above variables and then the simultaneous solution of the four normal equations for the regression formula.

When this was done for the selected variables in this study the following specific formula, with appropriate values for the constants, emerged:

$$X_{c1.234} = 38.8224 + .0712X_2 - .0299X_3 + .5179X_4.$$

The coefficient of multiple correlation was found to be:

$$R_{1.234} = \underline{.847}$$

This means that a very substantial part of the geographical variation in attitude toward Confederation has been "explained" by recourse to the variables used.

As to the universal relationship between each of the variables separately, it was found that there was a direct correlation between percentage of a district's voters favouring Responsible Government and its Population Potential. This also was the case with percentage of a district's voters favouring Responsible Government and Roman Catholics as a percentage of a district's population. On the basis of the evidence shown here there would seem to be a negative correlation with income. (However, the magnitude of this last mentioned relationship was so slight as to make the sign of the regression coefficient of little significance.)

B coefficients showing the relative importance of each factor on attitude separately were computed and are as follows:

$$\begin{aligned} B_{12.34} &= +.607 \\ B_{13.24} &= -.394 \\ B_{14.23} &= +.669 \end{aligned}$$

The precise size of these values must not be taken too seriously as the intercorrelation among the independent variables influences them. However, in summation it can be said that per capita income was apparently of little significance whereas the other two independent variables contributed substantially to the explanation of the geographical variation in the attitudes of the Newfoundland voters toward Responsible Government and Confederation.

It is also hoped that apart from the actual data used, the methods employed will help to show some of the uses for which statistical techniques can be employed in geography.

¹ Other statistical measures of interest to the statistician include: $S_{1.234}$ (standard error of estimate) here found to be 11.26; $R^2_{1.234}$ (coefficient of multiple determination) equal to .717; and .641 as the 1% fiducial level for R.

NOTES ON PORT STUDIES

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A debate is not necessary to prove that port studies have been written by geographers in Canada. There is some literature on port studies.¹ These studies have been treated in various ways and with a different emphasis. The object of this paper is to discuss some new trends and techniques. They are presented in the form of three notes: a) a new approach to port studies with less emphasis on the hinterland and more attention given to the maritime connections, b) classification of functions, c) classification of ports.

THE APPROACH TO PORT STUDIES

The traditional approach consists of a description of the port, its location and facilities, followed or preceded by an historical sketch, and concluded by a traffic study and an appraisal of its functions. Such studies are purely descriptive. They can be prepared by port officials, statisticians and economists. In order to make port studies more geographical, the port has to be related to the geographical conditions of the areas to which they refer.

By introducing the concept of the hinterland "the region to and from which the movement of goods and people is directed", the port studies became more geographical, relating the port to the region lying behind.² The word hinterland has a specific meaning when referring to port studies; it is the trading area or the area where the customers of the port are located. Most of the time the hinterland is scattered over a very large area, sometimes covering the whole of Canada, as in the case of the Atlantic and lower Saint Lawrence ports. The hinterland is usually delimited by a series of lines, one per commodity. The grouping of all these lines together form the basic hinterland. F.W. Morgan uses three hinterlands to describe the relationships of the port: the import, export and basic hinterland.³ The import hinterland is the area where the goods unloaded from vessels come from: the basic hinterland groups, the import and export hinterlands. (Figure 2). Instead of import and export hinterland it would perhaps be preferable to use the words shipping and receiving hinterland, because

¹ Indicated especially in Canadian Urban Geography, Bibliographical Series No. 13, Geographical Branch, Ottawa, 1954, 80 pp. Some titles deserve special mention as examples of what has been done in the past:

Brouillette, B.: "Le port de Montréal"; *Actualité Economique*, 11, 1935, pp. 113-145; "Le développement industriel du port de Montréal"; *Comptes-Rendus du Congrès International de Géographie*, Amsterdam, Tome II, section III B, 1938, pp. 8-36; "Le port et les transports"; *Montréal Economique*, Montréal, 1943, pp. 115-182, and "Le port de Vancouver"; *Actualité Economique*, 19, 1943, pp. 448-480. Camu, P.: "Le port et l'arrière-pays de Trois-Rivières"; *Geog. Bull.*, 1, 1951, pp. 30-56 and "Effets du projet de canalisation du Saint-Laurent sur le port de Montréal"; *Actualité Economique*, 28, 1953, pp. 619-637. Cornwall, I.H.B.: *A geographical study of the port of Vancouver in relation to its coastal hinterland*; (M. A. Thesis), Univ. British Columbia, Vancouver, 1952, and "Geographical Relationships of Types of Shipping in British Columbia Coastal Waters"; *Geog. Bull.*, 5, 1954, pp. 4-13; Matheson, M.H.: "The Hinterlands of Saint John"; *Geog. Bull.*, 7, 1955.

² Sargent, A.J.: *Seaports and Hinterlands*; London, 1938, p. 3.

³ Morgan, F.W.: "The Pre-War Hinterlands of the German North Sea Ports". *Trans. and Papers of the Institute of British Geographers*, 1948; pp. 45-55.

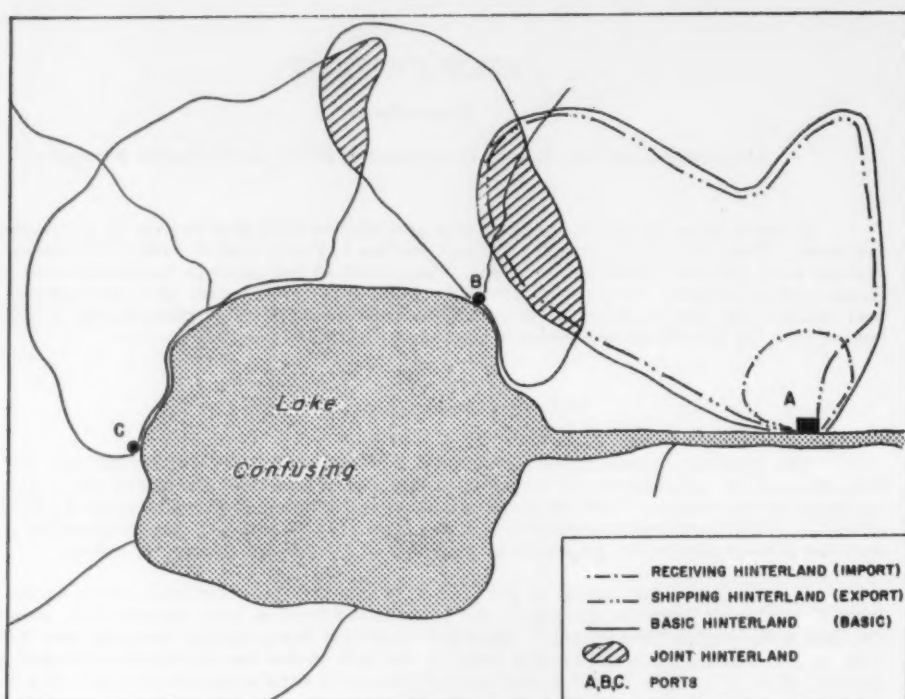


Figure 1.

they include all types of commodities loaded or unloaded, not exclusively the imports and exports, (Figure 1). There are also other types of hinterlands. A few are: joint or alternative, direct and indirect, and primary and secondary hinterland, defined as follows:-

- | | | |
|-----------|---|---|
| Joint | - | common area served by two distinct ports. |
| Direct | - | the same as the basic hinterland (defined above). |
| Indirect | - | the area served by a port through the intermediary of another port (after transshipment). |
| Primary | - | the area in which the port is well-established. |
| Secondary | - | the area in which other ports compete. |

These definitions indicate the variety of hinterlands. But the hinterland is only one set of relationships of a port, and too much importance has been given to it to the detriment of the maritime connections.

It is said that geographers still ignore the fact that the development of ports is determined by maritime factors as well as continental ones.¹ The geographer looks at a port from the street, rarely from the ship. As part of a port study, shipping companies, types of ships and maritime routes should be studied as well as the other two aspects mentioned before, the port itself and its hinterland. It must be remembered that a port is a junction between sea

¹ Lemierre, M. J.: "L' étude des ports industriels"; *Rev. Porte Océane*, 8, juin 1952, p. 13.

and land. It is a transit area, a "gateway through which goods and people move from and to the sea, by way of rail, inland water or sometimes road".¹ The location of a port between sea and land can be expressed by the following equation²: $a + b = c + d$. The "equals" sign corresponds to the port itself, its traffic and function. On either side of the port are the geographical areas where the customers of the port are located: ships and shipping companies as well as importers, industrial plants, trading organizations, etc. But the analogy breaks down however, when the two members are not equal, as can occur if the importance given to the hinterland is of more or less value to the port than the maritime connections. Examples of the maritime connections of the port of Saint John, are shown on Figures 2 and 3.

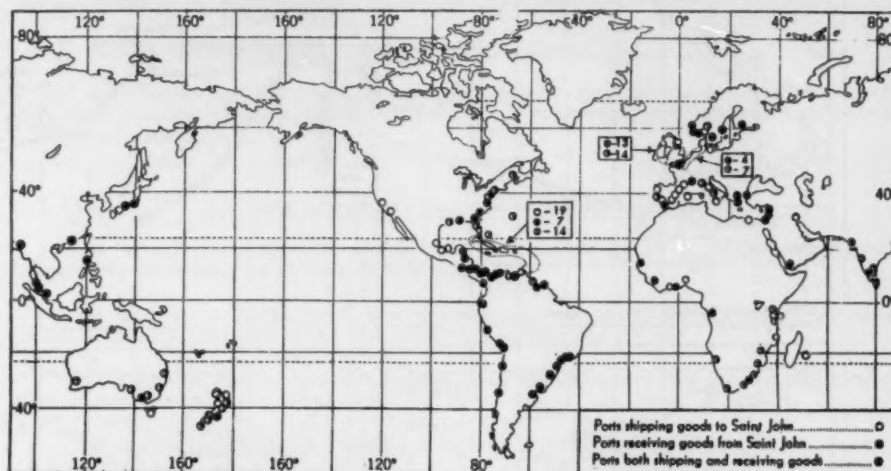


Figure 2. Foreign ports trading with Saint John, according to M. H. Matheson.
(Reproduced from Geographical Bulletin, No. 7, 1955).

A group of port specialists from Le Havre in France, have published in their local review, *Revue de la Porte Océane*, a series of articles entitled "Introduction to port studies". Their contribution is an important one to this field of research. Though they examine the various aspects of a port, they favour port studies discussed and prepared from the new point of view, from the sea side. The structure, organization, function, traffic and relationships of a port should be studied in regard to ships. The port is the terminal and the contact point of ships and its prime users are ships, not railway cars, buses and trucks.

PORT FUNCTIONS

In previous port studies a few functions were determined such as the industrial and commercial function, the function of a passenger's harbour and a fishing port, etc.

¹ Sargent, A. J.: op. cit., p. 3.

² Gottmann, J.: "Baltimore. Un grand port industriel"; Rev. Porte Océane, 5, août 1949, pp. 11-16, and sept. 1949, pp. 3-7.

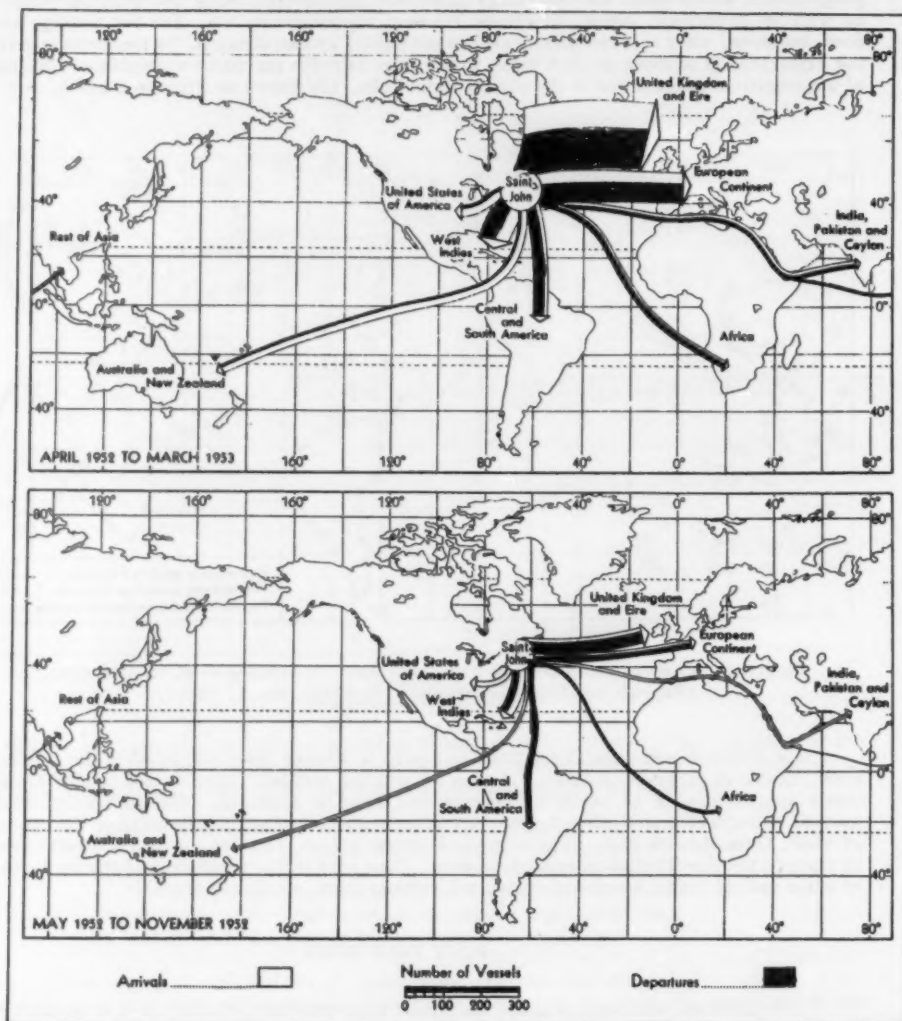


Figure 3. Foreign traffic of Saint John: Top - April 1952 to March 1953, Bottom - May 1952 to November 1952, according to M. H. Matheson. (Reproduced from *Geographical Bulletin*, No. 7, 1955).

Following the previous idea of the traffic equation of a port, the functions of a port could be divided into three categories:

- 1) functions determined by the activity within the port itself,
- 2) functions determined by the hinterland,
- 3) functions determined by the maritime connections.

Functions Determined by the Activity Within the Port

a) The industrial function which is exercised when a port services a local industry (industries located on the waterfront exclusively). All other industries using an intermediary mode of transportation (trucks or railway cars) between the ship and the plant belong to the commercial function.

b) The commercial function which consists of the redistribution of products. It can be a function of local supplies or local products to be shipped outside; it can be the supply of ships; it can be the transit function of goods coming from the hinterland or destined to the hinterland; it can be the transshipment of goods arriving and leaving by ship or it can be a storage function.

c) Other functions such as passenger, naval, fishing, etc.

A distinction has to be made between the industrial function of a port and the industrial port which traffics solely in bulky raw materials. Petroleum, gas, ore and coal ports are examples of industrial ports.¹

Functions Determined by the Structure of the Hinterland

a) Local function when the customers of the port are located in the immediate area of the port, on the waterfront or immediately behind it.

b) Regional function when the customers are located in one specific region, the metropolitan area behind the port or the area otherwise tributary to the city.

c) Super-regional or national function when the customers are located in several regions or scattered all over the country.

d) International function when the customers are scattered over several countries.

Functions Determined by the Structure of the Maritime Connections

These are the same as the functions determined by the hinterland but the meaning is different.

a) Local function: when vessels use the port as the only call as for instance, when a fishing fleet is in and out of the port every day. It also includes the traffic within the limits of the port, such as ferry-boats, tugs, barges, etc.

b) Regional function: when the port is related by coastal shipping to other ports of the same region. For instance the traffic within the Bay of Fundy in relation to the port of Saint John belongs to the regional function of Saint John.

c) Super-regional or national function: when the port is related to other ports of the country by shipping services.

d) International functions: when the port is linked with other ports of the world by shipping services.

These functions may vary in time, even within one season of navigation. A port can also perform several functions at once.

¹ Amphoux, M.: "Les fonctions portuaires"; Rev. Porte Océane, 5, sept. 1949, pp. 9-11. Most of these definitions have been defined by Amphoux in a series of articles about port studies. The functions determined by the activity of a port are said to be 'rationae materiae' according to the users, by opposition to another group of functions 'rationae loci', according to the hinterland.

THE CLASSIFICATION OF PORTS

The classification of ports was one of the subjects studied by the Commission in Industrial ports at the 17th International Geographical Congress in Washington in 1952.¹ There are several ways to classify ports, some of the systems being as follows:-

1. Classification by function: e.g., naval, fishing, ferry, refuge, port of call and bunkering, transshipment, free and entrepôt ports, outports, coastline, and short-sea sea-ports.² These classes are based upon the dominant function but many ports are multi-functional, involving another classification or sub-classification.
2. Sargent proposes to classify ports on the basis of the gauge of the channel of approach in relation to the draught of ships, on the basis of inland connections of a port, rail or water singly or combined, since this affects both the character of the goods handled and the nature and extent of the area over which they are distributed.³
3. Classification according to the physical setting: e.g., a fiord port, a coral harbour, an estuary port, a river port, a port on a delta arm, an artificial port, a headland and break-water port, etc. O'Dell cites the classification of ports according to Vernon-Harcourt.⁴
4. Classification according to the basic functions: e.g., industrial or commercial port.
5. Classification according to the hinterland: e.g., local, regional, super-regional, and international port.
6. Classification according to the maritime connections: e.g., local regional, super-regional and international port.
7. According to engineers, ports are inland sea, tide, basin, estuary ports, etc.
8. Classification according to types of ships: e.g., liners, tankers, tramps, fishing vessels, etc., each category being studied separately under three headings: a) according to national coasting, b) international coasting, c) regular ocean shipping.⁵
9. Classification into two broad categories: a) ports of continental dependency of which the activity is based primarily on the hinterland, b) ports of maritime dependency of which the activity is based on oceanic connections and the interior of the continents.⁶
10. Van der Ben has also proposed a rather complicated classification. There are four categories: A, according to the registered net tonnage of ships, from large vessels to ships of less than 2,000 tons; B, according to the type of vessels and type commodities; C, according to the equipment or port facilities; D, according to the engineering construction of the port. Thus a port can be classified by letters and numbers using a code such as the following example: A2, B4, C3, D1. This denotes a port capable of accommodating ships of approximately 10,000 tons, where liquid cargo is of prime importance, where revenues are derived

¹ Delmer, A.: "La classification des ports"; Preliminary Report of the Commission on Industrial Ports, International Geographical Union, New York, 1952, pp. 10-12.

² Morgan, F.W.: Ports and Harbours, Ch. IV.

³ Sargent, A.J.: op. cit., p. 23.

⁴ Report on the I.G.U. Commission on Industrial Ports, p. 8.

⁵ Amphoux, M.: "Les bases d'une économie portuaire"; Rev. Porte Océane, 6, avril 1950, p. 13.

⁶ Amphoux, M.: "Pour une classification des ports maritimes"; Rev. Porte Océane, 7, août-sept. 1951, pp. 5-7.

from the loading or unloading of one commodity, and where the engineering construction is of the tidal port type. There are six subdivisions of each of the four categories.¹

11. There is another system of classification which has not been proposed as such, but was outlined by Lemierre.² By using the following two ratios one can show some of the characteristics of a port, its functions and its maritime connections:-

<u>Ratio I</u>	<u>Ratio II</u>
$\frac{\text{Tonnage of Ships}}{\text{Number of Ships}}$	$\frac{\text{Tonnage of Commodities}}{\text{Tonnage of Ships}}$

These ratios were first applied to a group of French ports with the following results.³

TABLE I
Statistical Data of Leading French Ports for the Year 1948

Incoming Traffic	Number of Vessels	Net Registered Tonnage	Tonnage of Commodities Unloaded	Ratio I Mean Registered Tonnage	Ratio II Commodities Registered Tonnage
Marseille and suburbs	5,023	9,068,169	6,609,625	1,800	0.73
Marseille alone	3,945	7,159,767	3,018,378	1,810	0.42
Suburbs of Marseille	1,078	1,908,402	3,591,257	1,770	1.88
Le Havre	2,866	8,675,184	7,075,959	3,025	0.81
Rouen	3,323	4,701,186	6,371,202	1,416	1.35

Source: Lemierre, "L'étude du mouvement maritime dans les ports". p. 12.

The last two columns reveal that Marseille and suburbs and Le Havre are two identical ports, rendering the same services and performing the same functions. They have approximately the same ratio II (0.8). However, Le Havre is a port of call for larger ships than Marseille as indicated by ratio I (3,025 for Le Havre against 1,800 for Marseille). Marseille alone, when compared to its suburbs shows a great difference of structure. Ratio II is 0.42 for the port itself against 1.88 for the suburbs. The suburbs are the industrial section of the port. The same applies to Rouen. The author concluded by saying that a ratio of 1.88 to 2.0 corresponds to a type of industrial traffic (bulky and raw materials), and that a ratio close to 0.5 corresponds to a port with multiple functions, especially a commercial port.

These ratios were applied to certain Canadian ports as follows:-

¹ Van der Ben, W.R.: "Les bases d'une économie portuaire"; *Rev. Porte Océane*, 6, août 1950, p. 8.

² Lemierre, M.J.: "L'étude du mouvement maritime dans les ports"; *Rev. Porte Océane*, 5, nov. 1949, pp. 12-14.

³ Loc. cit., p. 12 and Amphoux, M.: "Le mouvement maritime dans les ports"; *Rev. Porte Océane*, 6, février 1950, pp. 21-24.

TABLE II

Traffic of National Harbours of Canada, 1953

PORTS	INCOMING TRAFFIC		OUTGOING TRAFFIC
	Ratio I	Ratio II	Ratio II
	$\frac{\text{Tonnage of Ships}}{\text{Number of Ships}}$	$\frac{\text{Tonnage of Commodities}}{\text{Tonnage of Ships}}$	$\frac{\text{Tonnage of Commodities}}{\text{Tonnage of Ships}}$
Halifax	1,825	.443	.341
Saint John (N. B.)	1,628	.365	.540
Chicoutimi	699	1.6	nil
Quebec	1,167	.398	.191
Three Rivers	637	1.3	.358
Montreal	1,742	.924	.933
Churchill	2,713	nil	2.561
Vancouver	628	.295	.289
	2,066	.580	

Source: Annual Report of the National Harbours Board for calendar year 1953, Ottawa, 1954.

The first ratio indicates that the ports of Halifax, Saint John, Montreal and Vancouver are called by vessels of the same category (1,628 to 2,066), while Chicoutimi, Three Rivers and Quebec are called by smaller vessels ('canalliers'). Churchill is unique, with only oceanic vessels as users of the port.

The second ratio indicates that the industrial ports, or the ports receiving industrial cargo, are Chicoutimi (coal) and Three Rivers (pulpwood, coal, oil), while the other ports have diversified functions. By eliminating the considerable traffic of tugs and ferry-boats in the Port of Vancouver, the ratios are more exact. On the whole these ratios describe fairly well what an observer would notice on the spot. These ratios were applied to both the incoming and outgoing traffic. The system of classification could also be applied to the total, oceanic and coastal traffic separately. A glance at the outgoing traffic figures will clarify the functions of the ports. Chicoutimi and Quebec do not have much freight to offer, while Churchill is an export harbour of raw materials.

Another group of Canadian ports was selected and classified according to the same two ratios. Table III reveals that according to the first ratio, Hamilton receives the largest ships (large ore carriers of the Great Lakes) while New Westminster is the port of call of the smallest ones. The second ratio (incoming traffic of commodities) shows clearly that the industrial function of three of the ports is the most important one. These three ports are Port Alfred (bauxite), Hamilton (ore and coal) and Toronto (coal, petroleum, cement, grain). Sydney is the regular type of port while New Westminster is mostly a shipping port. The outgoing traffic is also illustrated in Table III. Ratio II in this column classifies the functions of each port and shows Cornerbrook, Sydney and Sorel to be predominantly industrial ports, while the ports of Hamilton, Toronto and New Westminster are of the commercial type.

This system of classification is far from being a perfect tool. The use and comparison of statistical data is a limiting factor when dealing with these two ratios. A wider application of the system to other Canadian ports and other ports of the world might prove the usefulness of this technique.

TABLE III

Traffic of Selected Canadian Ports, 1953

PORTS	INCOMING TRAFFIC		OUTGOING TRAFFIC
	Ratio I	Ratio II	Ratio II
	$\frac{\text{Tonnage of Ships}}{\text{Number of Ships}}$	$\frac{\text{Tonnage of Commodities}}{\text{Tonnage of Ships}}$	$\frac{\text{Tonnage of Commodities}}{\text{Tonnage of Ships}}$
Cornerbrook	1,207	.584	2.079
Sydney	1,580	.904	1.070
Port Alfred	1,888	1.448	.177
Sorel	1,310	.779	1.014
Hamilton	2,393	1.952	.081
Toronto	1,494	1.274	.265
New Westminster	792	.146	.613

Source: Shipping Report year ended Dec. 31, 1953, sections II and III.

CONCLUSION

These notes on port studies have outlined recent methods and techniques, some of which have been applied in other countries. It is hoped that geographers in Canada will continue to work on port studies, remembering that numerous techniques are at their disposal. The main factor that must be remembered is to stress the relationships of a port with both dependencies, the continental and the maritime ones.

TWO CURRENT TRENDS IN CARTOGRAPHY¹

John A. Crosby

University of Toronto

Erwin Raisz, the dean of American Cartography, prepared a paper to be read last year before the AAG entitled, "The Changing Concepts of Maps Through History". Citing much the same materials which compose the historical section of his own excellent text, General Cartography, he pointed out how maps, through the successive periods of history, have reflected the dominant spirit of the time. To illustrate his point he mentioned early Greek preoccupation with the astronomical measurements of the earth; use of maps by Romans as an aid to travel and rule; the artistic extroversion of the Renaissance maps as a reaction to the medieval introversion and influence of "the Divine" on symbols and orientation; the 17th century maps, predominantly for military use; the trend toward exactness in measurement in maps during the 18th century "Age of Reason"; and the renewed emphasis on "scenic wonders" and atlases for travel during the period of 19th century Romanticism. "The machine age of the 20th century", continues Professor Raisz, "has perfect expression in the over-lettered, assembly line-produced contour map, which resembled Mother Earth so little that the cartographer had a rude shock when he looked down from a plane". He concludes, "Our present attitude is a stage of uncertainty and groping for a better cartography to bring the map closer to the country."

It is, of course, in the nature of fine craftsmen to slap the face of the present with the hand of the past, particularly as regards handmade versus mass produced articles, and Raisz is a very fine craftsman. But to dismiss the efforts so far in the 20th century as merely "overlettered contour maps", bearing "little resemblance to Mother Earth", and to characterize the present trend merely as an uncertain groping, is not only to ignore the diverse purposes of maps today, a diversity made possible only by mass production, but to ignore the new directions in which cartography has been moving for the last fifteen years or more.

Assembly line mass production has had the same effect in the field of cartography that it has had in most fields where it has been applied; it has made maps available to great numbers of people at relatively low cost. In the process, of course, the excellence of craftsmanship has declined. It becomes then, a question of one's own sense of values whether the sacrifice of craftsmanship has been justified or not. It is certain, however, that without low cost mass production, there would have been no mass market, and vice versa. And these two factors have made possible the great diversity that we see today, for only a mass market will justify the expense of compiling and printing, often in colour, a wide variety of maps. Moreover, the technological advance of our colour printing has released cartography from the confines of black and white reproduction, thereby creating limitless new possibilities for presenting mapable data.

Diverse as map types are today, the entire range of maps might be divided, for convenience, into three main groups: 1) those which provide basic data, 2) the compendium type, and 3) the special purpose map. The revolution in reproduction has touched all three. The basic data maps include such maps as the Canadian and U.S. topographic sheets, cadastral maps, and those made directly from surveyors' data. One of their chief contributions is accuracy of elevation and of location of natural and certain man-made features. It is probably this type that Professor Raisz had in mind, since they usually contain contours at 20 or 25 foot intervals. In any mountainous terrain, this makes for a rather "fussy" appearance. However, the "overlettering" he refers to could better be applied to the compendium type maps which appear in most atlases and which are periodically enclosed in issues of the National Geographic Magazine. The latter, frequently have, beside the countless town names, additional notations on historical events which took place at various locations. All this information superimposed on the usual network of streams and stylized treatment of mountains becomes a bit confusing. But since one of the major tasks adopted by atlases is that of place location, and since magazines such as the National Geographic are likely to have greater appeal to subscribers if they

¹ Paper presented at the January 1955 meeting of the Southern Ontario Division of the Canadian Association of Geographers in London, Ontario.

can see their "home town" on the map, such publications should not be damned for overlettering except insofar as it interferes with what could be a more accurate picture of the earth. Among atlases produced in the *New World*, there have been only occasional instances where it could be said that the lettering obscured the true picture of the earth, since the methods used to delineate the physiography would fail to give any sort of accurate picture of the earth, even if there were no lettering. The same is true of most wall maps produced in the Western Hemisphere.

As an interpreter of terrain, Raisz, himself, has long been known for his particular style of relief representation. Beautifully rendered in pen and ink, the physiography, viewed obliquely, is placed on a land surface viewed vertically. By careful selection of scale, conflicts which might arise from the two different perspectives are minimized. This style and medium are well suited to black and white textbook reproduction. Raisz depends on some fifty or more physiography symbols for the purpose of providing a visual index to landscape types. Not all, however, are of practical use on all maps because of scale considerations. Moreover, because they show type of landscape, rather than actual form as it exists at a given point on the earth, this technique falls short of the ultimate in map rendering: that of showing a picture of the earth, on a reduced scale, AS IT ACTUALLY EXISTS AND APPEARS. Though Raisz resorted to the device of landform type, rather than attempting to show the true physiographic features (except for isolated landmarks) this approach has produced more meaningful maps than the layer tint method, currently employed in most American wall maps and atlases.

On this point Professor W. H. Parker of McMaster University in his article, "Mountains are not Enough",¹ expresses dissatisfaction with what he refers to as the dominance of atlas maps by relief representation. The writer would be inclined to say, rather, that they were dominated by poor relief representation, for layer tints (the device most frequently used) at best convey only an indication of elevation. They do nothing to bring the land into true relief.

The Philips' World map shows some improvement by the addition of greyish brown shading on the southeasterly slopes, though there seems to be some local inconsistency in the source of light. However, much of the possible benefit is lost by use of the International Colour Sequence scheme. This order of colours from dark green to lighter green through yellows, orange, and brown, destroys any sense of lift which could be contributed by the colours even used alone. When shading is added, small "plateaus" develop at the lower altitudes, and at higher elevations the effect which the shading might have by strong contrast with a lighter colour is sharply diminished when used with dark browns.

The Haack maps make greater use of the warmer oranges and reds (at higher elevations) which at larger scales allow greater opportunity for modeling, not only with shading, but with hachures, too. The sequence of colours still employs many brown tones for some of the higher elevations, which, as in the case of the Philips' Map, fails to achieve a maximum appearance of relief. A map of Washington State was made by the writer as an experiment in plastic shading on a base of merged altitudinal tints. Rendered with coloured pencil, it employs a sequence of colours ranging from grey-green toward light green, olive, pale orange, yellow and white (for the highest snow-covered peaks). Even in the eastern half of the state, where the topography is extremely subdued, it is possible to show clearly the change in elevation from the Kennewick-Pasco Basin, at the sharp bend in the Columbia River, northeast toward Spokane. This was done simply by an even blending of colours, from grey-greens, which tend to recede from the eye, up to the lighter olive tones which tend to advance toward the eye. Though this system is extremely useful and has the advantage of showing relief by shading and use of colours whose sequence alone aids the achievement of relief as well as providing a colour key to elevation, it falls short of the ultimate: that of actually duplicating the appearance of the earth as well as its form.

In this respect, the finest work being done anywhere today is that being produced by Jeppesen and Company of Denver, and in particular by Mr. Hal Shelton, their artist-cartographer. It is he whom we have to thank for this particular new trend of Cartographic Realism. He has succeeded not only in "bringing the map closer to the country", to use Raisz's own words, but he has in fact, duplicated both form and appearance in maps which do much to ex-

¹ *The Professional Geographer*, September, 1953, p. 23-24.

plain the interplay of such factors as climate, terrain, agriculture, and population concentration. Mr. Shelton's work first came to public notice when Jeppesen and Company took on a contract to produce a unique brochure for United Air Lines that would provide passengers with a birdseye view of the terrain over which they were passing. United made arrangements to fly Mr. Shelton over all their regularly scheduled routes so that he could take notes on the terrain and on the colour of the landscape. This he did, pinpointing the data he gathered on an aeronautical sectional chart. This brochure met with such a favourable response that the company next secured a contract with Union Oil to make third dimensional road maps for a number of Western States. The idea of more realism in the portrayal of terrain for road maps has caught on with the public, as evidenced by the map passed out by the Wyoming State Highway Department. Happily for geographers, Jeppesen and Company are presently going into the wall map business on an expanded scale. In addition to their natural colour map of the U.S., they produce a fine World Map of similar type and soon will be publishing their new map of South America, which will feature a new technique of textured forested areas. The Company is also producing special maps for State Aeronautical Boards who provide a plane so that Mr. Shelton may "fly the State" to gather his material.

This trend toward Cartographic Realism is one example of what might be termed the MAJOR trend in cartography today: the movement away from engineering drafting and toward the graphic arts. The trend has been most obvious in our third category of maps, the "Special Purpose" maps. There is no intention, here, to de-emphasize the role of precision surveys in providing the basic cartographic information. It is intended, rather to point up the contribution to be made by the graphic arts in the interpretation and, especially, the presentation of data, in order to bring about a maximum impact on the persons who will see the finished product.

This trend embodies nothing more than the use of well known artistic principles of arrangement and the selection of proper tonal values, particularly the use of colour, where possible, to achieve emphasis of major points of interest. With similar intent, there is elimination, wherever appropriate of data such as grid lines, scales projection notes, and other impediments which do not contribute directly to the problem at hand. Often this means that more maps with less on them must be employed. This is possible where a mass market obtains, as in the case of news magazines. But it has also had a healthy effect on cartographic philosophy by putting a premium on the ability of a map to tell its message at-a-glance. The news reader has no time to study a complicated legend of seven or eight symbols involving several different types of data. To be of greatest impact, the news map must be able to get along with one or two items in its legend and depend on the ingenuity and imagination of the artist-cartographer to present a one-look picture which will tell the story.

The popularization of maps through the national publications has had a double effect. Beside making the public "map conscious", it has predisposed its thinking to expect from a map a clear, concise, and uncluttered picture. Professional cartographers and geographers could do well to follow this lead. Together we control the purchase of enormous numbers of atlases and wall maps and so are in a position to shape opinion as well as taste in maps, or else be willing to share the responsibility for poor maps. As Edward Ullman points out in his article, "Are Mountains Enough?",¹ "We, as geographers, cartographers or map publishers ... are partly responsible for the erroneous conclusions people draw of the nature of the world and its regions".

Yet, by demanding higher professional and artistic standards we as geographers can improve atlases and wall maps, the mass media in cartography, with all that that means in making the public more aware of the role geographers can play in increasing understanding of the world and its problems.

¹ *The Professional Geographer*, July, 1953, p. 5-8.

LE GEOGRAPHE CANADIEN

THE CANADIAN ASSOCIATION OF GEOGRAPHERS

PROCEEDINGS OF THE FIFTH ANNUAL MEETING

The Fifth Annual Meeting of the Canadian Association of Geographers was held in Toronto, at the University of Toronto, from May 29th to June 1st, 1955.

Sunday, May 29th

Conference registration began at 1 p.m. and at 8 p.m. the 1954-55 Executive Committee met for the last time.

Monday, May 30th

The formal meetings were opened by the retiring Association President, Dr. B. Brouillette. The programme then proceeded as follows:-

9:30 a.m. General Session

B. Brouillette, Montreal Ecole des Hautes Etudes Commerciales, presiding

G.A. Kellaway,

Notes on the Geology of the Mackenzie Delta.

J.K. Fraser, Geographical Branch, Ottawa,

Physiographic Notes on Features in the Mackenzie Delta area.

J.R. Mackay, University of British Columbia,

An Old Mackenzie Delta. (Read by title)

R. Brown, National Research Council,

Permafrost Investigations in the Mackenzie Delta.

J.K. Stager, Geographical Branch, Ottawa,

Progress Report on the Analysis of the Characteristics and Distribution of Pingos East of the Mackenzie Delta.

C.L. Merrill, Dept. of Northern Affairs, Ottawa,

Notes on Aklavik Relocation Project, 1954.

J.B. Bird, McGill University,

Postglacial emergence of the Land around Bathurst Inlet, Northwest Territories.

B.C. Matthews,

Soil Resources of Southern Ontario.

2:30 p.m. Panel Discussion

T. Lloyd, Dartmouth College, presiding

J.L. Robinson, N.L. Nicholson, D.F. Putnam,

Geographical Regions of Canada.

4:30 p.m. Business Meeting

B. Brouillette, Montreal Ecole des Hautes Etudes Commerciales, presiding

The minutes of the business meeting have already been published in detail but the main items are repeated below for the record.

The Canadian Association of Geographers Award.

The annual book prizes, for the best essay or thesis submitted as part of the requirements for the first degree with specialization in geography in each Canadian University Department of Geography, were awarded as follows:-

- Université Laval - Paul Bussières: "Madagascar d'après la littérature géographique".
 University of Manitoba - Linda Lucht: "The effects of the St. Lawrence Seaway on Canada and northeastern United States".
 McMaster University - John McClellan: "The Physical and Agricultural Geography of Pelham Township, Ontario".
 Université de Montréal - Paul-Yves Denis: "Whitehorse, esquisse de géographie urbaine".
 Université d'Ottawa - Pierre Larose: "Les particularités de la géographie de l'Espagne".
 University of Western Ontario - Ralph Krueger: "Study of urban blight, with special reference to London, Ontario".
 University of British Columbia - Roy Officer: "British Columbia's Salmon Industry".
 University of Toronto - D.J. Armstrong: "Fergus: An Urban Study".

The Canadian Association of Geographers Scholarship.

An award of \$250 was offered as a graduate scholarship for the best essay submitted on one of the following subjects:

- (a) Geographical aspects of winter in Canada.
 (b) Sources of industrial power in Canada.

The winner of the award was Miss J. I. Debreceen of the University of British Columbia.

Committees:

The new Executive Committee was elected as follows:

Honourary Presidents	-	R. Blanchard and G. Taylor
Past President	-	B. Brouillette
President	-	J. Lewis Robinson
Vice-Presidents	-	Pierre Camu, Trevor Lloyd
Secretary	-	Miss M. Matheson
Treasurer	-	Murray Dobson
Councillors	-	D.P. Kerr, N.L. Nicholson, W.G. Dean, W.C. Wonders, R.I. Ruggles, D.Q. Innis.

Tuesday, May 31st

9 a.m. General Session

J. L. Robinson, University of British Columbia, presiding

T. L. Hills, McGill University,
The St. Francis to the Chaudière River, 1830.

M. B. Ballabon, McGill University,
Development of the Richelieu Valley.

L. E. and C. L. Hamelin, Université Laval,
Industrialisation et Structure de l'Eglise dans le Diocèse de Trois-Rivières.

P. Camu, Geographical Branch,
Notes on Port Studies.

- J. Rousseau, Montreal Botanical Gardens,
Travelling with Northern Quebec natives from prehistoric to modern times, and Did
man ever domesticate animals from the wild? (Read by titles)
- T. Lloyd, Dartmouth College,
Norwegian Collaboration in Economic Development of Arctic Finland.

2 p.m. Panel Discussion on St. Lawrence Seaway

D. F. Putnam, University of Toronto, presiding

- | | | | |
|---------------|-------------|---|---|
| Participants: | P. Camu | - | From Quebec City to Cornwall |
| | H. Wood | - | From Cornwall to Prescott |
| | E. G. Pleva | - | From Prescott to the Head of the Lakes. |

7:15 p.m. Reception and Dinner Tendered by the University of Toronto

8:15 p.m. Presidential Address

B. Brouillette, Montreal Ecole des Hautes Etudes Commerciales,
The Role of Geography in General Education.

Wednesday, June 1st

9 a.m. Field Trip - Urban and Suburban Toronto

The trip included an examination of the Toronto harbour; a visit to the Regent Park slum clearance area; a traverse of the Mount Pleasant extension which climbs the Iroquois shore cliff; the northern terminus of the subway; Forest Hill - a first class residential area; a traverse of part of Davenport Road - an old Indian trail; the meat packing district; a traverse of the Queen Elizabeth Way; a study of Port Credit harbour; a tour of the new Ford Plant at Oakville, and a traverse of the Lake Shore Highway. The Luncheon was taken at the Queen Elizabeth Lodge.

FIRST MEETING OF 1955-56 EXECUTIVE COMMITTEE

At the first meeting of the new Executive Committee, the following Committees were appointed. The first name is that of the Chairman. In some cases, the chairman of the committee has been the only one appointed by the Executive Committee. He is responsible for the choice of one, two or more members of his committee.

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|-------------------------|---|
| Awards Committee: | T. Lloyd |
| Convention Committee: | According to locality (Toronto in 1955) |
| Education Committee: | H. A. Wood, J. Hamilton, T. L. Hills, |
| | D. P. Kerr |
| Membership Committee: | P. Camu |
| Nomination Committee: | P. Dagenais, J. R. Mackay, B. Brouillette |
| Publications Committee: | N. L. Nicholson, Editor |



